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VIEWS, NEWS AND INTERVIEWS.

About two years ago the agents of a prominent electrical manufacturing company installed a large plant in New York city. After the usual period of trial, during which the plant operated satisfactorily, a bill was presented. Payment was refused because the purchaser "understood he could get gas through the electric wires, and he hadn't been able to light it yet!"

An apparatus for preventing collisions between trains has been invented by Professor Pellat. It consists essentially of a band of traveling paper impregnated with iodide of potassium. A platinum stylus moves over the paper, and when a current of electricity passes through the stylus and the paper the iodide is decomposed, leaving a blue mark, as in the Bain chemical telegraph. The current is supplied by the moving train in the following manner: The wheels press down levers placed at intervals along the rails, and complete the circuit of a battery connected with the platinum stylus and paper of the apparatus, which is situated in the signal cabin. The marks thus made on the paper indicate the position of the train, and enable the signal man to trace its course along the line. Having this guide, as well as absolute control over the signals, he is in a position to reduce the chances of collision to a minimum, if not to render it impossible.

The will of the late John Stephenson, the veteran car builder, who died at New Rochelle, N. Y., on July 31, was filed for probate on September 13. The estate is estimated at $50,000, and the testator, after providing for the payment of his debts and funeral expenses, directs that all his property be divided into four equal parts. One each goes to his two sons, his daughter and granddaughter. The testator also forbids the sale of any kind of liquor on the property he has willed. The four legatees are appointed executors.

It is reported that the Electric Launch and Navigation Company, which operates the electric launch concession at the World's Fair, has disposed of 11 of its launches to a company which will put them in service on the canals of Venice, Italy, after the Fair is over. The consideration is said to have been $2,000 per launch.

Two Dutch inventors have devised a method for sterilizing milk by the aid of the electric current. There have been brought forward recently many proposals to sterilize water in this way, but milk has proved a much more difficult fluid, because of the large amount of pabulum for microorganisms which it contains. The milk to be sterilized is submitted to the action of a strong alternating current, which is applied to the milk in the ordinary dairy utensils. The process may, however, be worked continuously by passing the milk at a suitable rate through a narrow trough, fitted with a series of metallic plates connected with the poles of the source of electricity. It is claimed that by this method all microbes that may be present in the milk, whether derived from the air, the cans, or diseased cows, are destroyed, and that the risk of transmitting infectious maladies through this medium is obviated.

Lightning gives us the latest English conundrum: What is the difference between a leading inhabitant of heaven and a denizen of the lower regions? Answer: The one is an archangel and the other an incandescent angel.

A prominent German engineer paid a high tribute to American workmen in a speech before the Engineering Congress, at Chicago. Referring to the question of accuracy, he said: "I observe that your workmen work to the thousandth of an inch. Our workmen are just beginning to do so." Most Americans have been under the impression that German workmen had attained greater precision than mechanics in this country.

The secretary of the Crocker-Wheeler Electric Company, of this city, felt the recent hot weather severely, and in a moment of temporary aberration designed a removal notice for his company which may be thus described: A picture of a crock, followed by the letters "E R" (which may mean ELECTRICAL REVIEW). Then a picture of a wheel, followed again by "E R." Below this, the words "Have moved." Then a third line, "Ampere, N. J., is now their OHM." Translation: "Crocker-Wheeler have moved; Ampere, New Jersey, is now their home."

About election time, November 7, Mayor Gilroy, of this city, will appoint subway commissioners to succeed Jacob Hess, Walton Storm and Theodore Moss for a term of one year.

The latest achievement of science is the artificial production of marble from pure calcium carbonate. M. H. Le Chatelier, a French chemist, takes the calcium in the form of an impalpable powder and compresses it in a steel cylinder, between two pistons, with a pressure of 2,000 pounds to the square inch. While in this condition a platinum spiral, previously embedded in the powder, is heated by an electrical current, with the result that the powder in the neighborhood of the wire is rendered crystalline and translucent. Sections of the resulting substance, when examined underneath a microscope, exhibit the characteristics of certain specimens of slightly macled marble.

To obviate the occurrence of the ruts which are so often formed alongside the rails of street car lines, a French inventor has devised a metallic pavement, which is now being tried in Paris. In the French capital the wear and tear of the roads in consequence of this destructive action is so great that the tramway companies pay to the city authorities an annual sum of $100,000, in addition to another $20,000 for repairs caused by the lifting and readjustment of the rails.

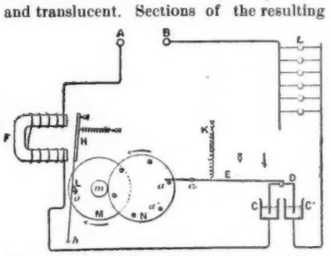
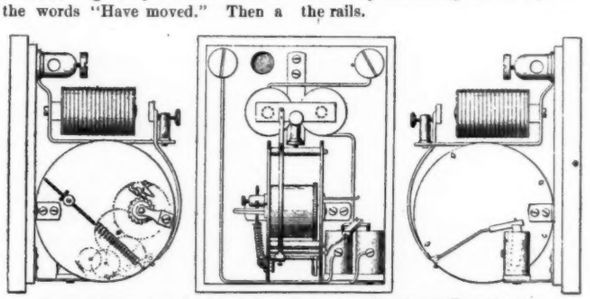


FIG. 1.—DIAGRAM OF CONNECTIONS OF NEW FRENCH CURRENT REGULATOR.



FIGS. 2, 3 AND 4.—END AND SIDE VIEWS OF CURRENT REGULATOR.

The rapid introduction of trolley cars has obliged the drivers of street cars to become motormen. An old driver says: "Experience counts in this trade just as it does in others. I've noticed that old hands at the reins are the quickest to learn how to run a trolley car, and their nerve is steadier than a beginner's."

A woman sat down to talk through a long distance telephone at Dover, Del., and as soon as she said "Hello!" her jaw became paralyzed. An attempt to force open her jaw resulted in its fracture.

Automatic Apparatus for Preventing the Unauthorized Use of Electric Light Current.

A great many electric light stations permit their subscribers to put as many lamps as they desire into their residences, stipulating, however, that only a limited number shall be used at a time. To prevent fraud, or to enforce this agreement, it is customary to employ commutating devices, by means of which the current may be switched rapidly from one circuit to another, but this method is objectionable, because it necessitates complicated apparatus at the central station. Another plan, as objectionable as the first, consists in the use of fuses of limited capacity, permitting only the passage of a certain amount of current.

The device which we shall presently describe aims to prevent a subscriber from wrongly using more current than he is entitled to under his agreement with the electric light company, while it is at the same time a reliable detector of fraud. The device may also be advantageously used in private light installations in which the current required for the number of lamps installed is greater than that furnished by the dynamo. In this case it serves to prevent the lighting of too many lamps, and thereby protects the dynamo or secondary battery from accidental damage.

The principle shown in Fig. 1 is as follows: Let L represent a row of lamps connected between the mains A and B. Included in the line are the electro-magnet F and two mercury cups C, C^1, into which dips a two pronged contact maker or breaker D. A wheel M, driven by any suitable motor, turns in the direction of the arrow, and carries at a point near its periphery a stop O, which, at a given time, strikes against the projection L^1 of the pivoted lever h, which carries the armature H of the electromagnet. It is evident that the wheel moves or stops in accordance with the position of the armature. The wheel M meshes with another wheel N, carrying a certain number of stops a, a^1, conveniently placed, which during the rotation of N raise the end of a pivoted lever E and lift D. In fact, they serve as cog wheels, transmitting an up and down motion to the lever when the movable part is operative.

Now, whenever a certain number of lamps have been lighted, requiring an amount of current that is insufficient to magnetize the electromagnet strongly enough to attract the armature H, then the device remains inoperative, and L_1 is retained upon O. In other words, the circuit remains closed and the lamps burn in their normal condition.

By lighting, however, an additional lamp, and assuming that the spring of armature H has been properly regulated to yield to a certain pull, the excess of current passing through F will be sufficiently powerful to cause the magnet to attract H, allowing the wheels M and N to move. Consequently,

stop *a* is forced against lever E, which in turn is lifted up, breaking the circuit momentarily, and the same process is repeated until the additional lamp is turned off, when stop O will bear again against L^1; because the current is no longer powerful enough to cause the attraction of the armature, hence the proper number of lamps continue to burn steadily.

On the other hand, assuming that the additional lamp which caused the operation of the apparatus has not been turned off, then, as soon as D dips into the mercury cup, and the current being strong enough for F to attract H, L^1 rises and permits the stop O to pass. The wheel continues to turn, and the circuit is again interrupted. In other words, there is a constant succession at regular intervals of extinction and relighting of the lamps. The commercial construction of the apparatus is clearly shown in Figs. 2, 3 and 4. The electro-magnet becomes active on an excess of .15 ampere.

Now the question may be raised: What happens if, in spite of the lamp signal, no one is present to attend to the matter? Would not in this case the extinction and relighting of the lamps continue in regular succession until the motor has run out? and at that moment the apparatus might come to rest with the lever E in its downward position, *i. e.*, the forks D being within the mercury cups. Thus the circuit would remain closed and the device become entirely inoperative, no matter how many lamps might be burning.

This possible occurrence has been provided for in a simple and reliable manner by the addition upon the axis of the wheel of a small copper knob of sufficient weight, and so placed that when the wheel mechanism stops, the wheel is mechanically turned by the extra weight until it takes up a certain predetermined position. In this position the upper end of the lever is pressed against an alarm device, and the current remains discontinuous until the subscriber arrives and manually resets the apparatus.

The clock motor employed in this apparatus runs a fortnight, and is constructed to give 2,700 interruptions, which number is deemed sufficient for practical purposes.

A long series of tests concerning the usefulness and reliability of the device has been carried on in one of the principal cities of France, and it is reported that the results so far achieved are highly gratifying to the electric light company, which has installed the apparatus in many of its subscribers' residences and places of business.

San Francisco Electric Company.

The board of city trustees of Berkley, Cal., have awarded the contract for city lighting for six years to the San Francisco Electric Company, of San Francisco. The contract calls for seventy-five 2,000 candle-power lights at $9.50 per light per month, to burn on all dark nights until 1.30 A. M. The company has ordered a Ball dynamo, and will probably use an alternating current dynamo for incandescent lighting.

Mr. J. Geo. Gardner, general manager of the San Francisco Electric Company, is well known to the electrical fraternity, and will be remembered as the manager of the Washington Electric Lighting Company. Mr. Gardner left Washington two years ago last February, and has been engaged in San Francisco ever since.

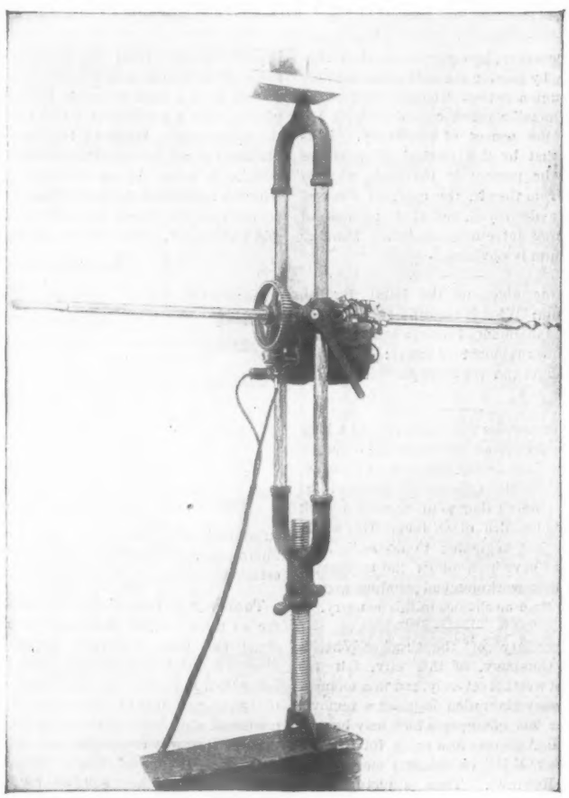
Washington Office of The Western Union Burned Out.

About six o'clock in the evening of September 13, fire was discovered in the Corcoran Building, at Washington, D. C., where the offices of the Western Union Telegraph Company are located. All communication with the outside world was soon suspended, and over 400 wires were cut out. The only wires available were a few at the Baltimore & Ohio depot, where several telegraph operators were at once detailed. The damage by water was as great as that by fire. The fire burned all night, but early the next morning Manager Marean and a corps of assistants began the work of repair.

A New Rotary Electric Drill.

A small portable drill for both anthracite and bituminous mines, to supplant the laborious breast drill, and to be used in place of percussion hand drills in work involving the removal of the slate or rock roof and floor, long needed, has been recently put out by the General Electric Company. Two types are made, one for heavy work in anthracite or drilling in hard slate or "boney;" the other for lighter anthracite drilling and for bituminous coal. The drills are interchangeable in their mounting, the same post taking either. The control of the motor is effected by a small plug switch. Feed screws of different pitch are furnished for varying the speed of boring, and a friction clutch protects the motor, should any particularly hard obstacles be struck suddenly. The columns are made in different lengths, and each is adjustable for about two feet variation. The construction of the drill and its method of mounting enable the operator to drill close to the roof, floors or walks as well as in any direction, as above noted.

A series of tests with one of the drills



GENERAL ELECTRIC COMPANY'S NEW ROTARY COAL DRILL.

were made at the Wm. A. Colliery, of the Connell Coal Company, at Durea, Pa., with the following results:

IN HARD SLATE.

With 4 thread per in. screw.

Material Drilled.	Threads per inch on feed screw.	Two foot depth hole.	Time.
1 Hard slate.....	4	2'	30"
2 Hard slate.....	4	2' 6"	32"
3 Anthracite coal..	4	2'	17"
4 Anthracite coal..	4	2' 6"	17"
5 Hard slate.....	4	2' 1"	30"
6 Hard slate.....	4	2' 6"	25"
7 Rock ("boney")..	6	2' 6"	50"
8 Rock ("boney")..	6	2' 6"	1' 34"
9 Hard slate.....	4	2'	

Test No. 4 showed a rate of drilling of six feet in 48 seconds. Tests No. 7 and 8 were made in a very hard rock, locally called "boney." It is about the same nature as a very hard white slate. A heavy blow from a mine pick makes very little impression upon it, and it does not cut easily or chip.

After the above tests were made the drill was taken to a part of the mine where the floor was being blasted up to get into another vein. This floor consisted of very hard rock (boney). No breast auger or hand machine drill could be used in it. The holes that had been put in previous to the arrival of the drill had been put in by the hand jumper, one man holding the bar and the other driving it with a sledge. The two men could put in a hole three feet deep in from two to two and a half hours. There was a large amount of water in this part of the mines, and it was expected that considerable difficulty would be experienced in getting rid of the dust and cuttings, as the water runs into the holes as fast as they are drilled.

Two men placed the drill in position, handling the frame and drill together. Time for drilling the five-feet hole was three minutes and 20 seconds. The augers when taken out of the holes were too hot to handle and had the appearance of having been pressed against a rotating grindstone, as fully one-quarter inch was ground off. These augers had been so hardened that a file would not make any impression on them, and they must therefore have met some very hard material. Five holes were drilled and blasted by two men between 1.30 and 4 P. M., and about 500 cubic feet of rock was loosened up ready for loading on to the mine cars.

The next day the drill was used for taking down 300 feet of roof along the main gangway, commencing at the shaft. The width of the gangway was eight feet six inches; average thickness of material blasted down, three feet. Two men handled the drill, two men tamped the holes for blasting, and eight laborers took away the material. Two men put in 60 feet of holes from 8.30 A. M to 11 A. M., tamping four of the holes in the meantime to allow two tampers to catch up. It was found that two men could easily drill holes faster than two men could tamp them for blasting. The nature of the material in the roof was hard slate and boney. All the holes were put in at an angle of from 30 to 40 degrees.

The smaller drill weighs, with post complete, only about 160 pounds, the drill itself weighing 100 pounds. In bituminous coal this drill shows a speed of drilling of five to seven feet per minute with a six-thread screw. These rotary drills evidently meet the requirements of strength, lightness, capacity, ease of control, adjustability, practicability and economy.

Illumination of the Sailors' and Soldiers' Monument at Indianapolis.

Last week the citizens of Indianapolis were treated to a sight such as they have never seen before. The magnificent soldiers' and sailors' monument in Monument Place was lit up with ornamental and elaborate designs outlined in incandescent lamps.

The opinions of those who have seen it would seem to indicate that the illumination at the World's Fair could hardly approach it in the beauty and elegance of the distribution of lights.

The Edison Decorative and Miniature Lamp Department, which executed the work, spared no pains to make the monument "a symphony in electricity." For the past three weeks a force of 50 New York electricians have been at work to present to the soldier visitors a sight surpassing anything of the kind yet seen in Indianapolis.

E. J. McAllister, the assistant manager of the department, has been on the ground, giving his personal attention to every detail of the work. He was assisted by Messrs. Edward F. Pickert, Frederick L. McCutcheon and George B. Tripp. Mr. Pickert was responsible for the arrangement of the lighting and the display pieces, while Messrs. Tripp and McCutcheon devoted their efforts to the technical details. Around the balustrade at the top of the shaft a triple corona of light was cast down on the shaft and up toward "Miss Indiana." Back of the first astragal windows were placed electric reflectors, throwing into bold relief the dates. Down towards earth a girdle of lamps encircled the monument, and served as an introduction to the display below, where the navy astragal was placed. In the center of the panel on the south side an immense American flag, outlined in lamps of appropriate colors, seemed to wave as though it were floating in the wind. Delicate ripples of light ran constantly over the surface of the flag, and made one forget that it was not waving in the air. This device was controlled by a very intricate switch moved by a tiny electric motor, which threw the current on and off the lamps, producing alternate waves of light and darkness, which gave the fluttering effect.

To complete the beauty of the illumination, the four monster search-lights played up and down, concentrating their rays upon the statue, and turning the darkness of the adjacent streets into mid-day brilliancy. These lights were of 20,000 candle-power each, and capable of throwing a ray three miles. They were put through a series of concerted evolutions—a regular drill, in fact, similar to that pursued at the World's Fair.

In making this display over 5,000 lamps were used, varying in candle-power from one to sixteen. Looking at the work, it is hard to realize the vast amount of labor required to attain the desired end, and this labor was not lessened by the fact that not a single nail or wire could be directly attached to the monument for fear of defacing the stone. All display pieces and belts of lamps had to be suspended by fine wires from the windows in the shaft. The greater part of the work had to be done with the "bos'ns chair," and the skill and nerve which some of the electricians displayed in putting up wires and lamps, while suspended 60 or 70 feet from the ground, won the applause and admiration of all who stopped to watch the progress of the work. In the corridor of the monument was located the switchboard, which was to the display what the brain is to the body. It required 15 switches to control the different circuits, and at first one might easily believe one's self in an electric light station. Four large cables, each carrying 950 amperes of current, fed to the board, and from the switches the wires run to the different displays. The entire construction of this intricate switchboard has been in charge of John C. Terry, who has been with the Edison Company for years, and is one of the best men in his line.

The latest application of electricity in marine work is to a deep sea fishing boat. A vessel has been fully equipped in England with facilities for utilizing electricity, not only for propulsion, but for hauling nets and every other purpose where power is required in the fishing industry.

World's Fair Exhibits of the Standard Electric Company.

TWO INTERESTING DISPLAYS IN ELECTRICITY BUILDING AND MACHINERY HALL.

Among the many exhibitors at the World's Fair who spared no expense to make their display a grand one, the Standard Electric Company, of Chicago, is very prominent.

FIG. 1.—WORLD'S FAIR EXHIBIT OF THE STANDARD ELECTRIC COMPANY, IN ELECTRICITY BUILDING.

This company has installed two separate exhibits, one in Electricity Building and the other in Machinery Hall, both of which we herewith illustrate.

Their display in Electricity Building occupies a large space in the Northwest section of the hall on the main floor.

Within the space mentioned, which is enclosed by a brass railing, are placed five arc machines—which are shown in operation—three machines respectively of 50, 30 and 20 lights of 2,000 candle-power, one of forty 1,600 candle-power lights, and one of fifty 1,200 candle-power.

They also have one 40 horse-power motor running at 1,200 revolutions, of the iron-clad type, built by the Rockford Electric Company, of Rockford, Ill., that is belted to the largest Standard generator, which operates automatically from short circuit to its full load of 50 lamps. This automatic regulation is one of the many special features of the Standard machine, and is operated as follows: Between the field poles at one side of the armature is rivetted a piece of Norway iron, attached to which is a brass rod connecting with two pawls, one above and the other below a ratchet bar, and so spaced that at the current at which the regulation is set to act, both are just out of contact with it.

The pawls are given a constant reciprocating motion, in opposite directions, by the rotation of a shaft belted to that of the armature, and running at 80 revolutions a minute, and the ratchet bar is connected at its long end with the brush cradle.

As the load on the machine rises and falls, therefore, the Norway iron rod is attracted more or less strongly, and by its rotation on its pivot brings one or the other of the pawls into gear with the ratchet bar, and lifts the brushes. Six seconds is all the time required to regulate the brushes from a load of one light to fifty lights. From the dynamo the current goes to a standard improved plug switchboard for five circuits, and thence to 56 arc lamps of 2,000 candle-power arranged about the space.

They also show mast arms, safety hangers, cut-outs, etc. Armatures, finished and unfinished, to show their simple construction and method of winding, are shown, one of them with an open commutator, an air space between each two segments serving as the insulation. The lamps of this company are too well known to require description. They are shown in all styles, single and double carbon, and for both in-door and out-of-door service. Their arc light plant, which is located in Section S, Machinery Hall, is one of the largest on the grounds, supplying current for over 1,100 arc lamps.

The plant consists of 20 generators, each having capacity of fifty 2,000 candle-power lights, which are arranged in two rows within the space, and are belted to shafts beneath the floor. The wiring is all concealed beneath the floor, both the leads to the switchboard and the wires to the ammeters, which are after a special design of the Standard Company. In the center of the plant is erected a model switchboard, capable of accommodating 21 circuits and 21 dynamos. It is of marble, of the plug pattern, and so arranged that the current from any dynamo in the block may be turned on any circuit. The company also furnishes the operating department with a 12-circuit board, used as an exchange board. In case the dynamos or engines in any plant should become disabled from any cause, by means of this board current from other plants may be turned on. The plant was installed with much care, and those interested in central station construction will find many new improvements in the method of operation recently adopted by this company.

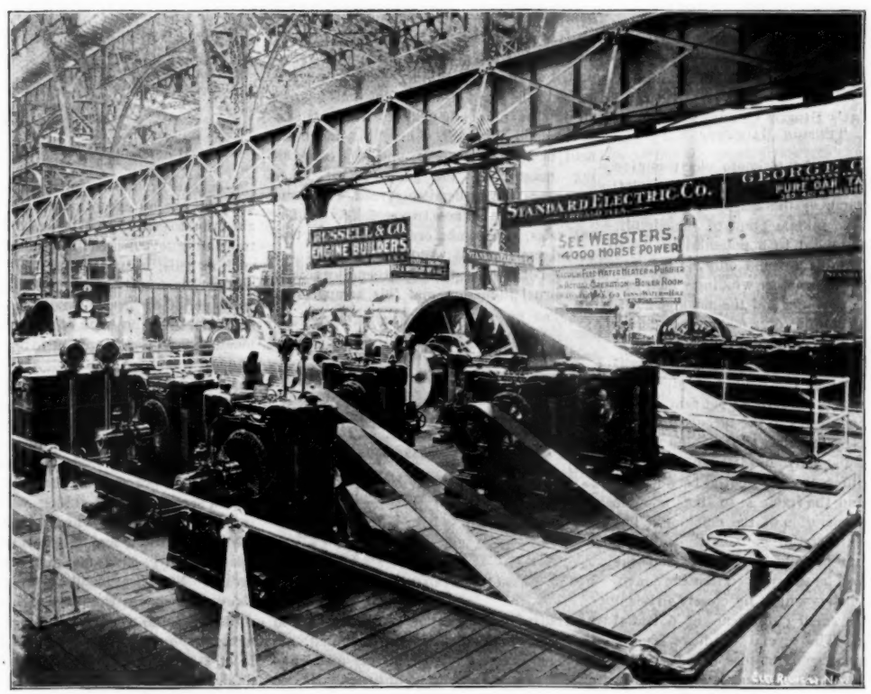


FIG. 2.—WORLD'S FAIR EXHIBIT OF THE STANDARD ELECTRIC COMPANY, IN MACHINERY HALL.

Execution Against Alexander, Barney & Chapin.

Deputy Sheriff Finn last week received an execution for $16,549 against Alexander, Barney & Chapin, a corporation dealing in electrical supplies at 20 Cortlandt street, New York, in favor of Patrick Gray, on assigned claims of Luke A. Burke, for money loaned and on notes. The business was started several years ago by P. H. Alexander, of Hyde Park, Mass.; Gen. C. H. Barney and Charles B. Chapin, of Hartford, Conn. They incorporated it in November, 1890, with a capital stock of $100,000. Luke A. Burke, a builder, obtained control of the company in 1891, becoming vice-president, and Messrs. Alexander, Barney and Chapin retired from the concern. The annual report last January said the liabilities did not exceed $65,000, while the assets were $75,000.

A telephone line has been constructed between Barre and East Montpelier, Vt.

Heard and Seen at the World's Fair.

The attendance at the Fair last week far surpassed any previous records, and the grand total of 1,000,000 paid admissions for the seven days was most gratifying to the management, and they are now estimating on the attendance for the remaining two months which the Fair will be kept open, which they have conservatively placed at 10,000,000, and from present indications will no doubt exceed that amount.

The great masses of last week was most noticeable in Electricity Building, which had its capacity taxed as it had never been before. The building was crowded during the entire week, and it is estimated that at least 600,000 visitors viewed the sights there produced by electricity.

A very amusing incident was noticed by a REVIEW representative while attending the Electrical Congress held in Chicago recently.

The REVIEWITE was surrounded by several members of the fraternity seeking copies of the latest issue, which arrived from New York that morning, when he was accosted by a good-looking lady of middle age, accompanied by a very green, gawky-looking boy, over six feet three inches in height, evidently her son, stating that they wanted to see Thomas Edison. Upon being informed that he was not present, inquired for Elihu Thomson. Upon looking down the hall, Mr. Thomson was noticed approaching, and was pointed out to the lady. As he came up to where they were standing they both looked in wonderment at him, and when he had walked slightly past them the young man mustered up courage and, nervously grasping Mr. Thomson by the arm, turning him around, said: "I am somewhat of a 'lectric man and want a job in your factory making electricity machines."

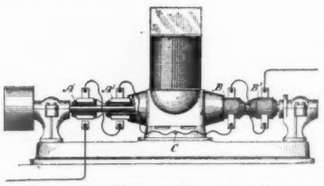
Mr. Thomson politely told him that he had no place to offer him, and passed on. During the few seconds the young man held Mr. Thomson's attention the lady who wanted to speak to him so much stood by with an astonished expression on her face, and was evidently so much overcome at meeting this prominent electrician that she could not utter a sound.

The automatic shoe blacking machine, in the Electricity Building, is well patronized in the eastern gallery, in which it is situated. It is very nearly a practical machine, but it will require several improvements in order to make it applicable to the "drop-a-nickel-in-the-slot" principle. As it stands now it is rather doubtful whether or not you get both of your shoes shined before the alloted time has elapsed.

THE LATEST STEPS OF ELECTRICAL PROGRESS.

Direct Currents of High Tension.

The important subject of transmission of power has had its greatest advance of late in the field of alternating currents. It has been commonly supposed that direct currents are not well adapted for transmission over considerable distances, by reason of the necessity of a commutator, which gives great trouble when currents of high tension such as are necessary for transmission of power over long distances are generated. It is quite possible, however, that the direct current will be rendered available for long distance work. A recent improvement made in this line by Mr. Charles S. Bradley, will be examined with interest. Some months ago there was published in the ELECTRICAL REVIEW a description of a system presented by Mr. Bradley, in which a number of direct current machines, either at the transmitting or motor station, were coupled in series and so arranged as to make their operation safe, both for the attendants and the machines. The latest improvement of Mr. Bradley is designed to furnish a direct current of high electromotive force from a single machine. The idea will be understood from the accompanying engraving, where it will be seen that the machine is provided with a number of commutators, four being shown, so that the difference of potential between the successive segments of any one commutator will be comparatively slight, and the brushes are connected in series, the middle point of the armature circuit being connected to the frame of the machine at the point marked C, for example. The important result attained by this construction is that the frame of the machine is brought to a comparatively high potential, and the dielectric strain upon the insulation is thereby materially reduced; for instance, if between the brushes of each commutator shown in the engraving there was a potential



BRADLEY'S DIRECT CURRENT HIGH TENSION MACHINE.

of 1,000 volts, the ultimate electromotive force of the machine would be 4,000 volts, and the frame of the machine, being connected to the middle point of the circuit, would be brought to a potential of 2,000 volts, so that there would only be between that part of the armature winding which had the highest potential and the machine a difference of potential of 2,000 volts, whereas without the base connection such difference of potential would be 4,000 volts. It will thus be seen that the danger of rupture of the insulation is reduced 50 per cent. It is, of course, necessary to the successful operation of this system that the machine should be well insulated from earth, so as to preserve the difference of potential between the windings and the frame as small as possible during the operation of the machine. The improvements are, of course, applicable to either drum or ring armatures, and the windings will be so arranged that the convolutions or layers which lie closely adjacent will have as small a difference of potential as possible. The several windings leading to the different commutators may be superposed and thoroughly insulated by mica insulation from one another. By a fine subdivision of the commutator and the employment of a number of commutators the aggregate electromotive force of a single machine may in this manner be raised to a very high point.

Multiplex Telegraphy.

A great obstacle to the success of multiplex telegraphy has been found from the self-induction of the signaling apparatus creating a lag in the transmission of impulses, so that the instruments could not respond promptly to the signals sent by the different operators. A certain amount of this lag is of course due to the line itself, and must be dealt with as a difficulty due to the combined action of static charge and discharge and self-induction, but the instruments used at terminal or intermediate stations are responsible for a large portion of the difficulty. Mr. Stephen D. Field has evolved a system in which that portion of the difficulty due to the self-induction of the instruments is overcome by rendering the latter "inductionless." One form of the system, an engraving of

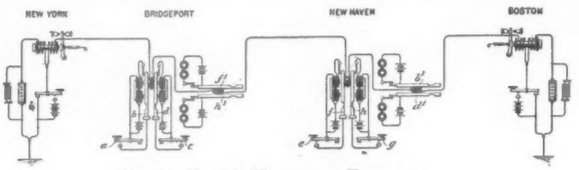


FIG. 1.—FIELD'S MULTIPLEX TELEGRAPH.

which is presented herewith, shows a combined duplex and harmonic system, the former operating on the well known balanced plan between terminal stations, as, for example, New York and Boston, and the latter being interposed in the line at such stations as may be found desirable, for example, at Bridgeport and New Haven, though the instruments might be interpolated also at other points or at the terminal stations. So far as duplex transmission between the terminal stations is concerned, it operates on the ordinary principle, an artificial or equating circuit being used at each terminal station, and a differential relay employed. The harmonic system comprises a series of vibrating reeds, the rate of vibration of which is rendered adjustable. Reeds having similar rates are located at different stations, so that when one acting as a generator is employed at one station, the corresponding reed acting as a receiver will be thrown into operation at the co operating station. The transmitting reed is operated by an electro-magnet controlled by a key, and is normally under tension, so that it will be ready to respond the instant the key is depressed. The transmitting and receiving reeds at any station are arranged in pairs and each carries a coil, the two coils being nested within one another and coupled in series in the main circuit. The coils float in an intense magnetic field, as illustrated in the second diagram, where the magnetic field is shown at N S, and the controlling magnet of the generator at E A represents the transmitting reed and B the receiving reed. These two reeds have different rates, as hereinbefore stated. The two nested coils are so wound as to assist the passage of current through them by reason of mutual induction, and this arrangement

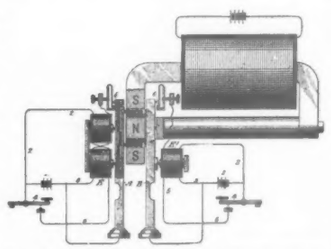
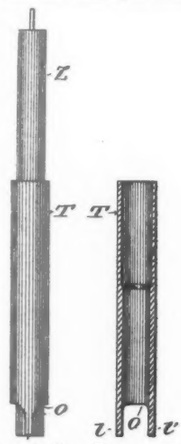


FIG. 2.—FIELD'S MULTIPLEX TELEGRAPH.

neutralizes the effect of self-induction, so that the coils, which, as before stated, are arranged in series relation to the main line circuit, are substantially obstructionless to the transmission of line currents. The operations of the duplex signaling will therefore be carried on over the line without self-inductive opposition from the interposed instruments at intermediate stations; whereas, the intermediate stations may communicate with one another by setting the reeds into vibration, and thus causing the floating coils to vibrate in the intense magnetic field, thus inducing currents which traverse the line and which have no effect on the balanced apparatus at the terminal stations, but set into operation the co-operating reed at a desired station. These instruments are equally applicable to a quadruplex system, since the functions of the harmonic apparatus in no way militate against those of the balanced system. All attempts heretofore to engraft upon a balanced system, such as a duplex or quadruplex, another system, have been commercially futile, because of the great self-induction of the interposed instruments. It is the counteraction of this self-induction which is the basic idea of Mr. Field's system. In the first diagram illustrated it will be seen that New York and Boston may communicate upon the duplex method; whereas, Bridgeport and New Haven have each two sets of apparatus—that is, a transmitter and receiver for each of two operators at each station, and all the operators may be using the line simultaneously.

Telephone Battery.

An almost universal difficulty with all batteries has been the inability to maintain the

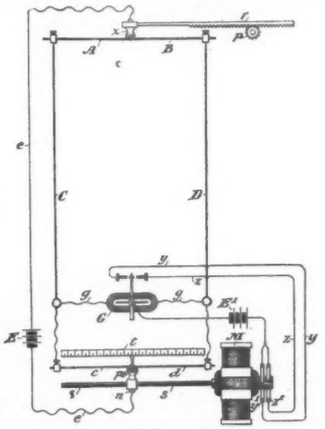


LYON'S ZINC PROTECTOR.

starting electromotive force. Open circuit batteries are no exception to the rule, and give rise to annoyance in the operation of translating devices used for open circuit work, such as bells, telephones, etc. If a battery whose electromotive force would not decline as its period of service lengthened could be supplied, the annoyance of frequent adjustment, now required for electric bells and telephones, would be avoided. A construction has been proposed by Mr. Edward H. Lyon, a diagram of which is herewith presented, in which this difficulty is materially mitigated, and, in addition, a uniform consumption of the zinc electrode is effected. Mr. Lyon's idea is to provide the zinc electrode with a sheath of hard rubber, such as indicated at T in the engraving, which fits over the zinc with sufficient closeness to just permit the latter to slide freely within the sheath. The sheath will preferably be cut away somewhat at the bottom, as indicated, so as to expose a limited area of the zinc to the action of the battery fluid. The tube is of a sufficient height to rise above the fluid, and the bottom of the zinc is placed in a small cup of mercury, or, if a porous cell is used, the bottom of the cell may be covered with mercury and the zinc placed within the porous cell. The result of this construction is that the action of the electrolyte is confined to the portion of the zinc exposed at the bottom of the sheath and to such zinc as filters through the mercury in which the zinc dips. In fact, the principal part of the action is found to be due to this filtered zinc, which, of course, is chemically pure, and maintains the electromotive force of the battery uniform for a long period of intermittent service. The zinc, as it is consumed, feeds down through the hard rubber sheath until all the zinc has been used up, and all the annoyance due to pitting and uneven wearing away experienced in ordinary cells is completely avoided. The mercury at the bottom dissolves away the zinc and feeds it to the battery solution, and, as the zinc is exhausted by the solution, more zinc is taken up by the mercury; and this process continues until all of the zinc has been used up. An incident of considerable importance also arises from the fact that, as the portion of the electrode which is attacked by the fluid is in substantially the same horizontal plane, no local action exists between different parts of the electrode. Mr. Lyon maintains that the uneven eating away of ordinary zincs is largely due to the fact that local couples are formed between different vertical portions of the zinc, probably because of a difference of density of the solution at the different levels. His improvement completely obviates this difficulty.

Electric Telemeter.

A number of systems have heretofore been described for various purposes, such as indicating at a distant point variations of temperature, pressure, etc., at another point. The latest of which we are advised is one proposed by Charles H. Haskins, which is illustrated in the accompanying engraving. The temperature indicator at the transmitting station, let us suppose a thermometer provided with a rotary index, carries a pinion P co-operating with a rack and causing a travel of a small roller over a German silver wire A, B stretched between two points. From the terminals of this wire extends two heavy copper wires leading to the distant station. These are made heavy so as to create almost no drop of potential between the two stations. Across the terminals at the receiving station is connected a galvanometer G, the needle of which plays between two stops in a local circuit, including a battery and electric motor. To the motor shaft is fixed a long screw on which is mounted a nut carrying a roller p' traveling over a German silver wire c, d. A scale may be placed parallel to the wire and a pointer mounted on the traveling nut. Any deflection of the transmitting indicator operates the pinion P, and shifts the roller x along the wire A, B. This sends current from the battery E connecting the two rollers x and p' through the galvanometer in one direction or the other, accordingly as the roller x is shifted to one side or the other of the center of the wire A, B. The galvanometer will



HASKINS' TELEMETER.

then swing against the right or left stop, according to the direction in which the roller x is shifted, and the motor circuit will be closed, causing the roller p' to be shifted along the wire c, d until an equilibrium of potential at the two sides of the galvanometer bridge is produced. Since the main line conductors are of sufficient size to create almost no drop, the galvanometer bridge may be considered as the bridge wire of a Wheatstone bridge, and will always operate the motor until the two sides of the circuit stand at the same potential, when the galvanometer will stand at zero and the motor circuit be opened. It will thus be seen that any indication made at the transmitting station will be automatically duplicated at the receiving station.

The Brussels Electric Underground Railway.

We have already recorded the fact that Brussels was about to lay down a system of underground electric railway, similar to, and, in fact, based upon the City and South London line, which has now been running over two years with complete success, and, for one, at least, with perfect regularity. The design of the tunnel—as will be seen from the accompanying illustration, reproduced from *Sciences et Commerce*—is almost exactly similar to the London one, and is the work of the same engineer, Mr. J. H. Greathead.

The Brussels line will require a capital of 17,500,000 francs to start it. The power which is to be put down in the form of machinery will be 2,000 horse-power for the 12 to 16 trains likely to be in operation at one time. Of this, 300 horse-power will be required for working 22 Otis electric elevators necessary for serving the 11 stations on the proposed line; and 100 horse-power more will be devoted to electric light. Thus, 1,600 horse power will be left for traction purposes, which, seeing that each train is stated, under favorable test conditions, to take 100 horse-power, does not seem to allow much margin for actual practice. The consumption of coal is put at 30 tons a day for an 18 hours' service.

The line will be built in a double circle, the outward and the return tube being laid side by side, and traversing the whole of the most thickly populated portion of the town. The service provides for a train every two-and-a-half minutes each way, and the arrangement of the separate tunnels, of course, makes collision impossible. The stations along the line will be in constant communication with each other by means of automatic signals and a telephone system.

Twelve borings will be made at different parts of the town, and the tunnel will be commenced at 12 places at once. The subsoil of Brussels is eminently favorable for the work, and presents no such difficulties as the London line, for instance, which had to pass beneath the bed of the Thames.

In addition to its mechanical features, the Brussels scheme has other points of interest. It will provide a nine hours' working day for the whole of its active staff, thus dividing the work equally between two shifts. The employés are also to derive some benefit from the profits of the line, which are estimated by the author of the scheme at five per cent. to begin with. Season tickets will be issued at 125 francs first-class, and 100 francs second-class.

The construction is estimated to take from 20 to 24 months, and a method has been devised for utilizing the clay which is taken out. The total initial expense, according to Mr. Greathead's report, will be 17 million francs roughly, and the working expenses 753,000 francs per annum. The receipts, taking 33 passengers per train as an average, are calculated at 2,428,272 francs, thus leaving a profit of 789,297 francs. The line, if it realizes the expectations of its promoters, will thus be a very fine paying concern.

Great stress is laid in the report on the advantages of electric over animal traction for urban traffic. It is asserted to be cheaper, less brutal, economical as regards labor, regular in point of service and incomparably more rapid. At the same time an underground line of the kind proposed is free from all noxious vapor, and is quite independent of climatic and other inconveniences. —*London Lightning.*

Pennsylvania Street Railway Association.

The second annual meeting of the Pennsylvania Street Railway Association was held at the Commonwealth Hotel, in Harrisburg, on the 6th of September. The meeting was not largely attended. In the absence of the president, John A. Coyle, H. R. Rhoads, of the Williamsport Passenger Railway Company, was called to the chair.

There was little done at the morning session except the appointment of a committee to nominate officers for the ensuing year. The committee consisted of John F. Ostrom, of the Middletown, Highspire and Steelton Electric Railway; Robert E. Wright, attorney for the Allentown and Bethlehem Rapid Transit Line, and Capt. Lanius, of the York Passenger Railway Company. The members of the association exchanged views upon the management of lines, related their experiences in operating various kinds of machinery, and chatted over matters in general for several hours. No addresses were delivered.

The following officers were elected for the ensuing year: President, H. R. Rhoads, Williamsport; vice-president, R. L. Jones, Reading; secretary, L. F. Light, Lebanon; treasurer, W. H. Lanius, York. It was decided to hold the next meeting in Reading.

The supply men present were W. H. Hay, Philadelphia; A. C. Nosbury, Syracuse; T. H. Taylor, Philadelphia; Arthur W. Field, New York; D. D. Book, Jersey City, and W. E. Boughton, of Philadelphia.

The principal aim of this association is to secure more liberal laws regulating the creation and operation of street railways in Pennsylvania. As the State Legislature will not be in session until 1895, the cause for the slight attendance at this year's convention is apparent.

The Niagara Falls Power Transmission Scheme.

BACKERS OF THE ENTERPRISE — SOME ERRORS CORRECTED — PROGRESS OF THE WORK—LARGE CONTRACTS FOR MATERIAL POSSIBLE.

A New York daily paper last week published a very misleading dispatch from Albany relating to electrical appliances for the State canals, transmission of power from Niagara Falls and the Cataract Construction Company. In order to correct these false impressions a representative of the ELECTRICAL REVIEW has investigated the matter with special reference to the transmission of power from the Falls, and the latest news obtainable in the matter is herein set forth.

The Cataract Construction Company, as is well known, is the company which was organized several years ago for the purpose of developing the immense, and until then, almost dormant power of Niagara Falls, with the object of transforming it into electrical energy to be transmitted for light and power purposes to cities and towns within a large radius of the source of power. Prof. George Forbes, the eminent English electrical engineer, has been consulting engineer for the Cataract Construction Company, and his views on several phases of the subject may be found in an interview which was published in the ELECTRICAL REVIEW for February 25, 1893. The Cataract Construction Company is building and will own the power plant at the Falls.

A sub-company known as the Niagara Falls Power Company will assume that part of the business which relates to the transmission and distribution of power from the Falls. This company must not be confounded with the Niagara Falls Light and Power Company, which, it is understood, is a company controlling a franchise granted to four persons for the purpose of supplying about 200 arc lights for street service to the city of Niagara Falls. So far as is known, their object does not include the transmission and distribution of power outside of the limits mentioned.

In the Albany dispatch referred to, the names of Drexel, Morgan & Company, W. K. Vanderbilt, Winslow, Lanier & Company, D. O. Mills, Brown Bros. & Company, Morris K. Jesup, August Belmont and Isaac N. Seligman were mentioned as the moneyed men behind the Niagara Falls Light and Power Company. The fact is that these prominent men are not connected with this company, but are identified with the Niagara Falls Power Company.

In an interview with Mr. Morgan, of Drexel, Morgan & Company, an ELECTRICAL REVIEW representative learned that, as a firm, Drexel, Morgan & Company are not interested, but that some of the partners are stockholders in the Niagara Falls Power Company. Mr. Isaac N. Seligman, of the firm of J. & W. Seligman, the well known bankers, said that his firm, as a firm, was interested in the same company. A representative of August Belmont & Company stated that members of the firm were interested, but that the banking house, as a firm, did not hold stock in the Niagara Falls Power Company.

Mr. Edward A. Wickes, second vice-president of the Cataract Construction Company, kindly gave the information as above in regard to the various interests of the Cataract Construction Company, the Niagara Falls Power Company and the Niagara Falls Light and Power Company. Mr. Wickes was asked how soon the transmission of power from the Falls would be actively commenced.

"Within a very short time," he replied. "We are going ahead as rapidly as possible, and are receiving bids and plans for the generator plant, which will be decided upon as soon as possible."

"The ELECTRICAL REVIEW has understood that foreign manufacturers of electrical apparatus were bidding for the generator plant in competition with American manufacturers. Is this so?"

"We are not seeking bids from foreign manufacturers," replied Mr. Wickes.

"Is it true that you have secured a right-of-way for your power transmission conduits along the banks of the Erie Canal in New York State?"

"We are making contracts with individuals and companies already organized, and are organizing companies in cities and towns which we shall ultimately reach with our service, by which we secure certain privileges and rights-of-way."

Mr. Wickes did not seem inclined to definitely commit himself as regards the use of the canal banks for the conduits; in fact, all the work of the Cataract Construction Company has been carried on in a very quiet and almost secret manner, the policy of the company being not to make public any steps of the work until they were thoroughly completed.

As the majority of the readers of the ELECTRICAL REVIEW already know, this power transmission scheme from Niagara Falls is the most stupendous undertaking of the kind ever attempted. The amount of material, the construction work and the detail electrical apparatus which will be required in the various installations will mean that several very large and important contracts must be awarded before the whole system is in working order.

VIEW IN TUNNEL OF BRUSSELS ELECTRIC UNDERGROUND RAILWAY.

Young Men's Institute.

On Tuesday evening, October 3, special exercises will be held in the hall of the Young Men's Institute, 222 and 224 Bowery, to formally open the educational work for the season of 1893–4. This institution has for several years been doing a very valuable work in offering to young men engaged during the day exceptionally good evening classes in subjects bearing directly on their daily work.

There are technical subjects which assume a prominent place in the curriculum—classes in carriage drafting, steam engineering, practical electricity, mechanical and architectural drawing and freehand drawing; also in practical arithmetic, penmanship, bookkeeping, shorthand, typewriting, English grammar and composition, vocal music, glee club and first aid to the injured.

The school year continues until May, when prizes, diplomas and certificates are awarded. The classes are open to all young men from 17 to 35 years of age.

Business is Better.

The Ansonia Electric Company resumed work in the electro-plating department at Ansonia, Conn., on September 11. In the wire department a lack of material prevented starting up, but wire will be received from Wallace & Sons in a few days, so that work can be begun.

Big Consolidation Reported in St. Louis.

A press dispatch from St. Louis, under date of September 13, states that the reported absorption of the Municipal Electric Lighting and Power Company and the Missouri Electric Light and Power Company by the Edison Illuminating Company is probably true.

The stockholders and bondholders of the Missouri and Municipal companies will exchange their property for cash and Edison securities. The Municipal Company has a debt of $1,500,000 six per cent. bonds, and a capital stock of $1,500,000.

The Missouri Company has issued $500,000 first mortgage six per cent. bonds and $600,000 second mortgage six per cent. bonds. The law requires them to have a capital stock at least equal to the sum of the bond issues, namely, $1,100,000.

Trouble in Brazil.

The bombardment of Rio de Janeiro, Brazil, by the rebel fleet began on September 14, and the firing became so severe as to necessitate the abandonment of the telegraph office. This may cause additional delay in the transmission of official dispatches. Telegrams sent *via* Lisbon have passed uninterrupted, but the Galveston and other lines have experienced much trouble in getting telegraphic matter through.

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CONTENTS.

	PAGE
Views, News and Interviews	49
Automatic Apparatus for Preventing the Unauthorized Use of Electric Light Current	49
San Francisco Electric Company	50
Washington Office of the Western Union Burned Out	50
A New Rotary Electric Drill	50
Illumination of the Sailors' and Soldiers' Monument at Indianapolis	50
World's Fair Exhibit of the Standard Electric Company	51
Execution Against Alexander, Barney & Chapin	51
Heard and Seen at the World's Fair	51
The Latest Steps of Electrical Progress	52
The Brussel Electric Underground Railway	53
Pennsylvania Street Railway Association	53
Young Men's Institute	53
Business is Better	53
The Niagara Falls Power Transmission Scheme	53
Big Consolidation Reported in St. Louis	53
Trouble in Brazil	53
Electric Traction in New York—From the Battery to Harlem in Fifteen Minutes	54
The World's Congress of Electricians	55
Wall Street and the Electrical Stock Market	55
American Electro-Therapeutic Association	55
Obituary	55
A Correction from Prof. Elihu Thomson	55
Fort Wayne Electric Company	55
Letters from a Laboratory	55
Electric Machine Tools and Factory Equipments	56
Book Review	56
A Severe Test Given to the Universal Electric Company's Conduit System at Coney Island	56
Old-Time Telegraphers	56
The Western Electrical Supply Company	57
Electricity on a Pyramid	57
An Electric Horse-Feeder	57
A New Commutator Brush	57
A New Electric Cloth Cutter	58
Electric Light Flashes	58
The "S. & C." Interlocking Carbon Connector	58
Advance Information	59
A Large and Progressive Binding and Mailing Concern	59
Underwriters' International Electric Association	59
Telephone Chat	59
Telephone Injunctions	59
Kindred Interests	59
Electrical Patents	60

INDEX OF ADVERTISERS.

COVER PAGES.

	PAGE
American Electrical Works, insulated wire	i
American Railway Improvement Co	i
Ansonia Brass & Copper Co., wire	xii
Armington & Sims, engines	xii
Beacon Vacuum Pump and Electrical Co	i
Campbell Electrical Supply Co., insulating tape	i
Clarin & Kimball, Novak inc. lamps	i
Day's Kerite, insulated wire	i
Eastern Electric Cable Co., insulated wire	xii
Eddy Electric Mfg. Co., motors	i
Empire China Works, porcelain specialties	xii
Faraday Carbon Co., carbons	xii
Goubert Manufacturing Co., Stratton separators	xii
Hampson & Co., E. P., engines	xii
Hulbert Fence and Wire Co	xii
Jewell Belting Co., belts	xii
Moore, Alfred F., wire	xii
National India Rubber Co., wires and cables	i
Okonite Co., insulated wire	i, ii & xii
Paine & Ladd, patent attorneys	i
Rhode Island Tool Co., drop forging, etc	xii
Ridlon & Co., general machinery	xii
Riker Electric Motor Co., motors, dynamos	i
Simplex Electrical Co., insulated wire	i
Stirling Co., boilers	xii
Waterhouse, Gamble & Co., arc lamps	i
Westinghouse Electric & Manufacturing Co	xi
Weston Engine Co., engines	i
Wilmot & Hobbs Mfg. Co., bell goods	xii

INSIDE PAGES.

Allis & Co., Edward P., engines	60
American Bell Telephone Co	x
Baker & Co., platinum	60
Barrett, John A., electrical engineer	59
Berlin Iron Bridge Co., iron roofs and buildings	v
Billings & Spencer Co., wrenches	60
Bishop Gutta Percha Co., insulated wire	vii
Blaisdell & Co., machinist tools	vi
Brill Co., J. G., tramway cars	viii
Brixey, W. R., Kerite wires	vi
Brown Electric Co., cleat	v
Brush Electric Co., apparatus	v
Buckeye Engine Co., engines	xiii
Butler Hard Rubber Co., battery cells	ix
Carpenter Enamel Rheostat Co., rheostats	iv
Case Engine Co., J. T., steam engines	vi
Clark Electric Co., arc lamps	vi
Columbia Incandescent Lamp Co., incandescent lamps	iv
Cutter, George, electrical supplies	vi
Dixon Crucible Co., belt dressing	viii
Edison Decorative and Miniature Lamp Department, incandescent lamps	60
Electric Construction and Supply Co., Ward arc lamps	viii
Electric Selector and Signal Co	iv
Electro-Light Engraving Co., engraving	ix
Equitable Life Assurance Society	60
Falls Rivet & Machine Co., friction clutches	v
Fidelity Carbon Manufacturing Co., carbons	iv
Fort Wayne Electric Co., dynamos and apparatus	iii
General Electric Co., multipolar transformers	vii
General Electric Launch Co., electric launches	59
General Incandescent Arc Light Co., arc lamps	ix
Globe Iron Roofing and Corrugating Co	iv
Greeley & Co., The E. S., supplies	v & 59
Harrisburg Foundry & Machine Works, engines	ix
Helios Electric Co., arc lamps	v
Holmes, Booth & Haydens, insulated wire	viii
Johns Mfg. Co., H. W., vulcabeston	vi
Lake & Co., J. H. & D., pulleys	viii
Leclanche Battery Co., batteries	60
Leffel & Co., James, water wheels	vi
Lehigh Valley Creosoting Co., creosoted lumber	ix
Marshall, Wm., condensers	viii
Mason Electric Co., primary batteries	vii
National Electric Mfg. Co., dynamo-electric machinery	vi
National Pipe Bending Co., feed-water heater	vi
New England Butt Co., braiding machinery	ix
New Jersey Lamp & Bronze Works, electric and gas fixtures	v
New York Belting and Packing Co., rubber belts	x
New York Insulated Wire Co., wires and cables	x
Ohio State University	60
Onondaga Dynamo Co., electrical apparatus	iv
Ostrander & Co., W. R., supplies	iv
Partrick & Carter Co., electrical supplies	59
Phillips Insulated Wire Co., insulated wire	v
Phosphor-Bronze Smelting Co., castings	viii
Photo-Engraving Co., engravings	60
Pope, Read & Rogers	59
Porter Electric Motor Co., electric motors	iv
Queen & Co., electrical instruments	60
Ries Electric Specialty Co., regulating socket	viii
Robinson & Orr, steel rails	59
Royal Columbian Electric Co., dynamos and motors	iii
Royce & Marean, electrical supplies	viii
Russell & Co., steam engines	v
Shawmut Fuse Wire Co., fuse wire	60
Shoemaker, Homer, attorney and counselor-at-law	59
Siemens & Halske Electric Co., electrical machinery	iii
Standard Electric Co	vii
Standard Paint Co., insulating compounds	viii
Tyndall, Wm. D., attorney	iv
Washburn & Moen Mfg. Co., wire	60
Western Electric Co., supplies	x
Weston Electrical Instrument Co., measuring instruments	vi
White Dental Mfg. Co., acid gravity battery	60
Whitney Electrical Instrument Co., instruments	vi
Wilson, Fremont, electrician	59

Those of our subscribers who fail to read regularly "Letters from a Laboratory" miss the opportunity of acquiring varied and timely information. These letters contain the results of experiment, not theories and guesses.

The attendance at the World's Fair has passed the million-a-week mark, and it is expected that this average will be maintained or exceeded from now until the close of the Fair. If you haven't been to that great White City, go at once.

Out in Victoria wire fences have been adapted for use as telephone lines. In our Western country there are thousands of miles of barbed wire fencing which might be used for telephonic communication between isolated points. The idea seems at least worthy of investigation.

The General Electric Company has recently dispensed with the services of some of its most valuable men and, it is said, would let many more go if it were not for existing contracts with them which must be carried out. It has been intimated that several of the more prominent ex-General Electric men are seriously considering the formation of a large electric company as a competitor of General Electric.

We give on another page a brief description of the Brussels electric underground railway, and call the attention of the New York Rapid Transit Commission to it. The tunnel will be constructed on the Greathead system, which has proved such a complete success in London. It seems that within two years the people of Brussels are to have a practically perfect rapid transit system, while the people of New York city, a little village of nearly 1,900,000 inhabitants, or over four times the size of Brussels, will fume and fret for proper transit facilities perhaps till the end of the century.

ELECTRIC TRACTION IN NEW YORK —FROM THE BATTERY TO HARLEM IN FIFTEEN MINUTES.

Ever since rapid transit underground by means of an electric railway system was broached there seems to have been a good deal of hesitating doubt upon the subject, not only on the part of the uninitiated citizens, but also on that of our great daily papers, and, seemingly, even on the part of some of our city authorities whose approval is to be obtained before any specific motive power can be adopted.

Let us once for all endeavor to assure everyone concerned that there is no difficulty in most successfully operating an underground, or, for that matter, an elevated railroad system with electric motive power. We take this opportunity to emphasize the statement that, given the right of way and the structure, be it a tunnel or a viaduct, extreme rapid transit by means of electricity can be absolutely predicated.

We have now gone through years of practical evolution of the electric railway, but in that time we have been through and are now quite recovered from a burning fever of energetic improvement and unceasing study and practice. How many years elapsed between the construction of the first and the thousandth mile of steam railway in this country? But the electric railway, it must be remembered, came into our practical life in this last and most remarkable quarter of this wonderful century, and after ten years of grand achievements in the field of electrical mechanics; after the successful launching and continued profitable existence of many very large lighting enterprises, telephone exchanges, stock telegraphs and myriad smaller ventures. All these had prepared the way, and, unlike the advent of the steam horse, the public mind and the capitalist's pocket were to a great extent prepared to back the young, but tried, giant to essay electric traction. And what a record he has made! We do not believe that in all the wonderful history of mechanical and scientific progress there is anything approaching the meteor-like introduction of electricity as a motive power.

Already it has got a footing among the steam railways. The new belt line tunnel under Baltimore will, in the near future, be completed, and become a monument to its engineers by reason of the use of electric locomotives. These are of 1,400 horse-power each, and will ere long be flashing long trains of cars through the tunnel without maddening noise or stifling smoke. Already Chicago, with her wonderful enterprise, is feeling the benefit of electric rapid transit, and the results will surely make plethoric the pockets of those interested.

High speed can be and is attained. Forty miles an hour is already a regular schedule on one or more interurban electric roads, and without any special construction beyond a particular winding and gearing of the motors. By a little special designing of the motive apparatus, whether in the form of electric locomotives or individual car propulsion, we unhesitatingly say a speed, between stops, of 50 miles per hour is entirely practicable, and, what is of equal importance, its cost is not going to be high. It is going to be simply a skillful adaptation of means to end. The means are at command, the end is known—Battery to Harlem in 15 minutes—and we could to-day lay our hands on electrical engineers of repute who would without hesitation stake their reputation on success.

On consideration, there really is no difficulty. The ordinary steam road bed and 70-pound rails, with heavy bridge joints, would make a track whose joints could not be perceived by the passenger, and certainly not felt. The means of conveying current into the motors presents no difficulty whatever. Motors fully competent for the work have not only been designed, but built and tested most severely. Speed is merely a function of the car wheels as related to the rate of revolution of the motors. All the elements of the power house for an electric railway are even better understood than that for a cable road. Where, then, is the difficulty? We see none at all.

On the other hand, the advantages of electric rapid transit underground are overwhelming. The tunnel would be free from smoke and the stifling gases of combustion inevitable to steam locomotion. It would be free from sparks and cinders, and the rapidly moving trains would keep it well supplied with fresh air, even without artificial ventilation, which could easily be provided, if needed. It could be lighted throughout, as could also the cars, so that every passenger could comfortably scan his daily paper, no matter how crowded the train. There would be no nauseating atmosphere on wet days. The highest safe speed could be relied upon, and Harlem would be, for express trains, a quicker ride from City Hall than is Fourteenth street now on the elevated railroad. And, perhaps as important as any other feature, the entire line could be operated by an automatic block system, rendering collisions practically impossible.

We commend these remarks to the Rapid Transit Commission and the daily press. If they can allege any false statement we shall be glad to discuss the question fully, and our columns are always open for such discussion, when not merely trivial.

Electric rapid transit in New York city must come, and we trust the Commissioners will not close their eyes to this important fact.

"A limited amount"—depending on the speed of the printing presses, probably—of the capital stock of the Pennock Electric Company—primary battery fraud—is offered for sale in Bridgeport, Conn. Come one, come all! Buy quick, or you will not get your name on the list of gullible idiots who invest in the Pennock system, which can put "20 horse-power in a boat and deliver 100 horse-power—yes, 200 horse-power—at the propeller shaft." In the language of this irrepressible schemer, "think of it."

The death of Frederick L. Ames, of Boston, who was an active working director in the General Electric Company, and the strongest representative of the New England interests in the company, may have considerable influence on the future of the organization. He was regarded as the wealthiest man in Massachusetts, his fortune being variously estimated at from $20,000,000 to $40,000,000.

How would this state of affairs look if it were true? Mr. C. A. Coffin, president of the West End Street Railway Company, of Boston; Mr. H. McK. Twombly, president of the General Electric Company, with a managing committee of three, and Mr. O. T. Crosby as chairman of the committee.

Wrap up your fan motor in something, grease the bright parts, and set it away in some secret place. Get out your desk electric light fixture, dust it off and set it up. The short days of the winter solstice are nigh.

THE WORLD'S CONGRESS OF ELECTRICIANS.

HONORABLE SECRETARY CARHART WRITES AN EXPLANATORY LETTER—THE BAD MAN WITH BADGES—HOSPITALIER'S CRITICISMS—LORD KELVIN'S ENDORSEMENT—ANNOYANCES OF THE CONGRESS, YET RESULTS SATISFACTORY.

TO THE EDITOR OF ELECTRICAL REVIEW:

Will you permit me to comment upon some statements in your journal for September 16, relating to the recent Electrical Congress?

First, respecting the mistake or treachery of the man who made the badges, and who was detected the very first afternoon of the Congress, selling them at 20 cents. So far as known, all of the badges thus sold, except four, were recovered or were voluntarily returned by the purchasers when they discovered the fraud. I leave your readers to pass judgment upon the holders of the four, who thus evaded paying 80 cents toward the expenses of an enterprise that has cost much labor and money, and that has been pronounced a grand success on all sides. At the same time they secured admission to all that was offered, including the trip to the World's Fair and the Tesla lecture, while outsiders, I am told, were offering $10 for the privilege of attendance. Several persons who have borne the burden of the preparations for the Congress would be very happy if their assets were not lessened by more than $100 in consequence. I am not talking at random.

I hesitate to refer to the interview with M. Hospitalier. There always remains the danger that the statements made to the interviewer are not correctly reported, even where there is no intent to do otherwise.

The looseness which M. Hospitalier reports in the conduct of the Congress appears to be confined to the one point that the minutes of the "Chamber of Delegates" were not printed from day to day. That criticism was made during the meetings, and an attempt was made to secure printed reports, with the result that they were not received from the printer till after the adjournment of the meeting on the following day. Either Chicago printers have an excessive amount of business or else they are incompetent to get out a small amount of matter on short notice. The same annoying delay occurred in the printing of the general programme of the Congress. The copy was placed in the hands of the printer Saturday afternoon, and the programmes were not ready at three o'clock on Monday afternoon. The copy was not ready for the printer earlier for the reason that the Programme and Executive Committees came together from widely separated points, and could not be got together earlier than they were.

Respecting the Committee of the Chamber of Delegates on Notation and Nomenclature M. Hospitalier can have no cause whatever of complaint. The committee had two lengthy sessions, and came to substantial agreement. They had before them the proposals of M. Hospitalier, of Professor Jamieson and of Drs. Bedell and Crehore, all in printed form. The report of this committee was received and ordered to be printed as an appendix to the general report of the Chamber, but the Chamber of Delegates declined either to adopt the report or to advise its general acceptance. M. Hospitalier may have been disappointed with this result, but it was all that the Chamber felt justified in doing.

I may add that the proceedings of the Chamber were all reviewed at the final meeting on Saturday, after the Congress adjourned, and a committee was appointed to draw up the necessary specifications respecting the use of the silver voltameter and the setting up of a standard Clark cell. The entire proceedings will be printed, and one or more copies will be sent to each member of the Chamber.

It remains only to add that Professor Mascart, who represents the highest scientific attainment and authority in electricity in France, expressed himself as very highly pleased with the Congress and with its results. I cannot too strongly express my appreciation of his courtesy in proposing that the "henry" be accepted as the name of the international unit of induction. He took a prominent part in all the discussions of the Chamber, and accepted the results as a satisfactory international agreement.

It is not generally known that a letter was received from Lord Kelvin during the sittings of the Chamber of Delegates, and that his views in almost every particular coincide with those reached by the Chamber.

American electricians may be excused for expressing considerable satisfaction that an international congress has been held on American soil, which included among its numbers such representatives as von Helmholtz, Mascart, Ferraris, Ayrton, Preece, Thompson and Rowland; and if minor arrangements and some of the details were not what we all could have wished, yet these should be overlooked in view of the substantial results which are certain to be of international importance.

Truly yours,

HENRY S. CARHART.

Ann Arbor, Mich., September 14, 1893.

Wall Street and the Electrical Stock Market.

The Senate's delay on the repeal vote of the Sherman clause in the silver bill was an adverse factor which has made the market during the past week one of hesitation. Other similar factors tending to cause the same result were the bad September crop report and the decrease in September earnings. Money on call has grown quite easy. The financial outlook seems obscured in doubt and great responsibility rests with the Senate on the repeal question. A great part of the recent improvement is undoubtedly due to the handsome majority for repeal recorded in the House, and if a similar result could be assured in the Senate, the effect would immediately be apparent in the stock market.

Edison Electric Illuminating Company, of New York, showed an increase of two points for the week on its fives bonds.

The closing prices to-day of electric stocks on the Boston Stock Exchange were as follows:

	Bid.	*Asked.*
Boston Electric Light	—	105
Edison Electric Illuminating	—	125
General Electric	46	46⅜
General Electric pf.	65	80
Westinghouse Electric	21½	22
Westinghouse Electric pf	41	43
Fort Wayne Electric	5	6

The Western Union estimated net revenue for the quarter ending September 30, was $1,800,000; last year it was $2,200,000, and in 1891 $2 000,000; interest and sinking fund, $233,346; dividend, $1,185,000; total surplus, $7,258,473. A 1¼ per cent. dividend will be payable October 16. Books close September 25.

The Edison Illuminating Company, of Brooklyn, shows for August:

	1893.	1892.	Inc.
Gross	$17,671	$14,133	$3,538
Net	4,702	3,015	1,687

New York, September 16.

American Electro-Therapeutic Association.

The third annual meeting of the American Electro-Therapeutic Association was held at Chicago, beginning September 12. The president, Dr. Augustin H. Goelet, of New York, presided at the meeting. The programme and titles of papers read have already been published in the ELECTRICAL REVIEW.

Prof. W. J. Herdman, of Ann Arbor, Mich., was chosen president for the ensuing year; Dr. Franklin H. Martin, of Chicago, first vice-president; Dr. A. Lapthorn Smith, of Montreal, second vice-president; Dr. R. J. Nunn, Savannah, treasurer; Dr. Margaret Cleaves, New York, secretary. The Executive Council for the ensuing 12 months is composed of Dr. Augustin H. Goelet, New York; Dr. W. J. Morton, New York; Dr. G. Betton Massey, Philadelphia; Dr. Robert Newman, New York; Dr. C. R. Dickson, Toronto. A committee was appointed to investigate electrical illuminators for therapeutic and diagnostic purposes.

It was decided to hold the next meeting of the association on the last Tuesday in September, 1894, at New York city. The convention was then closed by a speech by the outgoing president, Dr. Augustin H. Goelet, of New York, and the formal induction into office of the president for the ensuing year, Dr. W. J. Herdman.

OBITUARY.

DEATH OF FREDERICK L. AMES.

FREDERICK LATHROP AMES.

Frederick Lathrop Ames, the well-known capitalist, financier and railroad man, died on the Fall River boat "Pilgrim," on September 13, of apoplexy. Mr. Ames left Boston on the previous evening for New York, and on the arrival of the boat in this city the following morning, he was discovered lying dead in his stateroom. The body was embalmed and taken back to Boston for burial.

Mr. Ames was an officer or director in between 70 and 80 corporations, but was most heavily interested in Union Pacific and General Electric. He was an active working director in the latter company, and was the strongest representative of its New England interests. Mr. Ames was also a director in the Western Union Telegraph Company, in which he had large holdings. He was considered the wealthiest man in New England, his fortune being variously estimated at from $25,000,000 to $40,000,000.

C. O. Rowe, superintendent of the Western Union Telegraph Company, at Pittsburgh, Pa., died there on September 12.

A Correction from Prof. Elihu Thomson.

TO THE EDITOR OF ELECTRICAL REVIEW:

In a sketch of Mr. L. B. Marks, in your issue of September 9, occurs the following:

"The great prominence which he has gained through the reading of this paper, and the *many handsome compliments he received at the hands of Prof. Elihu Thomson*, Silvanus P. Thompson and other prominent electricians, makes," etc.

There is a mistake somewhere. I did *not* hear Mr. Marks' paper, made *no* comments on it, gave *no compliments in or out of company with others*. Had I commented on the paper itself, I should have simply said that the results, though interesting, were not likely, in my opinion, to constitute any practical advance in arc lighting, and that I could see no warrant nor reason for calling an enclosed arc light "A New Incandescent Arc Light."

I feel it my duty to ask that this correction be given as prominent a place in your paper as the mistaken statement itself was given, particularly as the article in question, winding up as it does with the statement that "a large company has been formed for exploiting his invention," *puts me in the decidedly false position of endorsing it* as a new advance and as a practical affair.

Yours truly, ELIHU THOMSON.

Lynn, Mass., Sept. 14, 1893.

[The above statement from Professor Thomson we promptly publish, regretting that he has been misquoted. It is not only a correction, but gives the opinion of the author of the value of the "incandescent arc lamp" described by Mr. Marks before the Electrical Congress. "The proof of the pudding is in the eating," and this new lamp is now to be tried by a number of electric lighting central stations where it will be put to practical tests. Prof. S. P. Thompson, Prof. E. L. Nichols, Dr. Leonard Waldo, Franklin L. Pope and others, we understand, have endorsed this lamp as a distinct and important advance, and we shall await with interest the results of these tests.—EDITOR ELECTRICAL REVIEW.]

Fort Wayne Electric Company.

It is rumored that the Fort Wayne Electric Company, of Fort Wayne, Ind., has severed its relation with the General Electric Company, although no official announcement of the fact has been made. It has been understood that the contract existing between these two companies is of such a nature as to leave the Fort Wayne Company to a great extent independent.

LETTERS FROM A LABORATORY.—LXIII.

BY JULIAN A. MOSES.

Carbon, that substance which we choose to say has three distinct forms as an element, and concerning whose elementary form the theories advanced state, with one or two exceptions, that in each of the three forms, carbon may be in a state of absolute purity, is indeed a boon to the electrician and to the world at large. Among those who have advanced the different theories, some have stated that a certain amount of hydrogen is responsible for the remarkable changes.

Graphite, or plumbago, as well as the substance commonly called "carbon," have shown themselves of the greatest use in the applications of many principles in electric science. But the diamond, as yet, has shown no other qualities available by the electrician other than those of extreme hardness and the power of slight electrification. No other uses have been diligently sought for it, for even if they were discovered, the rarity of the diamond would preclude its general adoption in any large quantities.

The uses of carbon and graphite are legion, and no one can reasonably make the assertion that we have approached anywhere near to the limit of their applications. New inventions are recorded every day, which could never have been conceived did we not possess either of these two forms of carbon.

It has been said that other things would have been found as substitutes, but the cost of these two forms of the element, which may be reckoned in most cases as practically *nil*, would, metaphorically, make carbon, in addition to its being one of the most useful elements, the "dearest and the cheapest of them all."

The power of variable conductivity, possessed by the crystalline or amorphous forms of carbon when subjected to the slightest increase or diminution of pressure, and the many simple ways of recording this alteration of resistance, have enabled experimenters to chronicle many valuable inventions, which in the end have been either unique or useful in their character. There are several inventions which have been made that have as yet not been adopted as practical; such, for instance, as the photophone or radiophone, which is at the present time merely in an advanced embryonic stage. The telephone, however, shows the employment of carbon in the most practically advanced stage, and every day, improvements or new inventions show that the uses of carbon have not all been found.

A new and novel device employing this principle has been made recently, and while at the present time it is merely in the experimental stage, there can be little doubt but that it will fill the needs for which it was devised.

Rain gauges have been made which have shown themselves to be satisfactory; but those instruments which have been constructed to measure the impact of the rain drops over definite areas have been expensive and most delicate of manipulation. The before mentioned device electrically recorded not only the impact of the rain drops but the exact duration of the fall; and, in case there were successive showers, the precise length of time of each, together with the time of day at which they occurred.

Briefly described, the apparatus was arranged as follows:

Exposed to the air, but protected from winds, was a large metallic plate coated on the underside with a thin deposit of platinum. This plate rested delicately, counterpoised by adjustable springs, on a thin block of carbon. In the center of this plate, which was slightly conical, and polished to prevent the sticking of the drops, was a tube which allowed the water to flow to an automatic balance. Different sized circular diaphragms had openings of different areas on which the drops fell. The carbon plate rested on another platinized plate. A large cylinder, on which was wrapped record paper, was operated by clockwork so as to make six revolutions per hour. A glass siphon stylus, actuated by a sensitive electro-magnet, being attached to the influenced armature, moved from side to side as the impact of the rain drops caused a variation in the conductivity of the carbon which was placed in the circuit with the electro-magnet. When no rain was falling nothing but a straight line appeared on the cylinder, and thus the periods between showers could be readily ascertained.

This apparatus is nothing more or less than a new application of a well known principle, but the object for which it was constructed was attained.

Electric Machine Tools and Factory Equipments.

No subject can be of greater interest to manufacturers than the economical transmission and distribution of power. Under the usual manufacturing conditions involving the driving of tools or machines intermittently operated, only 15 to 25 per cent. of the total power supplied by the engines

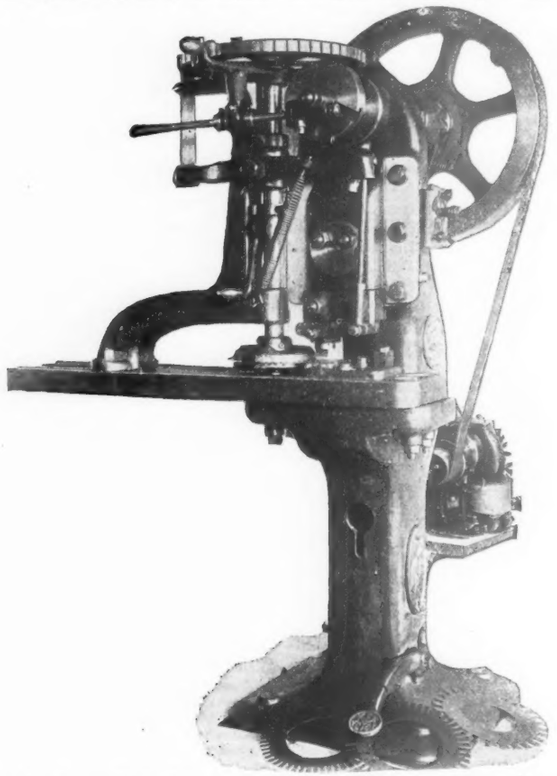

FIG. 1.—PUNCH PRESS OPERATED BY CROCKER-WHEELER ELECTRIC MOTOR.

is expended in useful work. It is well known that a very large portion is required simply to move the great pulleys, belting and shafting which, starting from the engine room, convey the power from floor to floor, and distribute it to the different wings and parts of the factory.

Owing to the heavy and cumbersome nature of the system of shafting, pulleys and belting alluded to, not only does the great expenditure of power required to move these mere carriers or conveyers of power go on constantly, whether the whole factory is in operation or only the most distant part of it, but so great is the friction of the great moving mass that no proportionate effect is felt at the cut-off of the engine by the minor and constantly occurring stoppages in the use of a large part of the individual machines, lathes, looms or tools. These single and short stoppages aggregate an enormous amount of time, and, therefore, of power or coal wasted.

The Crocker-Wheeler Electric Company, 39 and 41 Cortlandt street, New York, are prepared to furnish a system so connected with the cut-off of the engine, so perfectly responsive and sensitive to all such changes of intermittent work, even to the most minor ones, that the amount of energy demanded from the engine is only that actually being employed in the doing of useful work. They claim to be able to show any candid and fair-minded manufacturer that they can save him, by a properly designed and installed electric plant, from 30 to 50 per cent. of his coal bills, besides giving him a system greatly superior in every respect to the old one.

Not only is the electric system so much more economical and possessed of the advantage of greater flexibility, but it so perfectly indicates the varying increase or decrease of power in use that the manufacturer is able from his engine room, or from his private office, if he chooses, to know at any moment, by a glance, the amount of work actually going on in any part of the factory.

An electrical transmission involves no losses by condensation, as is unavoidable in the case of steam or compressed air when transmitted to a distance, and the losses due to friction or resistance of conductors should not be more than five per cent. in a well arranged transmission.

The Crocker-Wheeler Electric Company have given especial study to this branch of the practical application of electricity, and invite correspondence and investigation from all manufacturers. They will be pleased to show those interested the workings of the system in their own factory, and also to show by other work they have done that they have long and completely passed from experiment to practical and successful operation. The system is not only economical and convenient, but absolutely reliable.

In applying the power to the individual tools, a still further saving may be made by building the motor in as part of the machine, instead of setting the motor on a foundation at a suitable distance and belting it to the tool in the ordinary way.

This construction gives rise to directly connected machine tools, a new line of machinery destined to be of great importance. These machines are the regular standard tools of the market, but with motors combined, being properly proportioned for that purpose, so that when the small flexible cable or "lamp cord" is connected to them they become operative, self-contained tools, and readily portable if desired. Machinery of this kind obviously has a number of important advantages. It requires no "setting up." It can be moved and then used so readily that it makes temporary shifting of machinery to meet requirements of extra work in one department practicable. A single tool can be run at any time without running others, thus saving all shafting friction, etc. The tool having no belts, and the power being generated in the "head stock," just where it is consumed, the machine runs quieter, etc., etc. This company have a variety of direct connected machines already in use, and are prepared to design motors for all classes of machine tools.

Their electric lathes are built on this principle, the motor armature taking the place of the belt pulley, and the field magnet frame being part of the lathe bed, thus securing simplicity and rigidity. The tool possesses many advantages suggested by the hints above, and is recommended for all machine shops, laboratories, etc., where electric current can be obtained. Other makes of lathes are fitted up with motors when ordered. Other tools of similar forms are fitted in the same way.

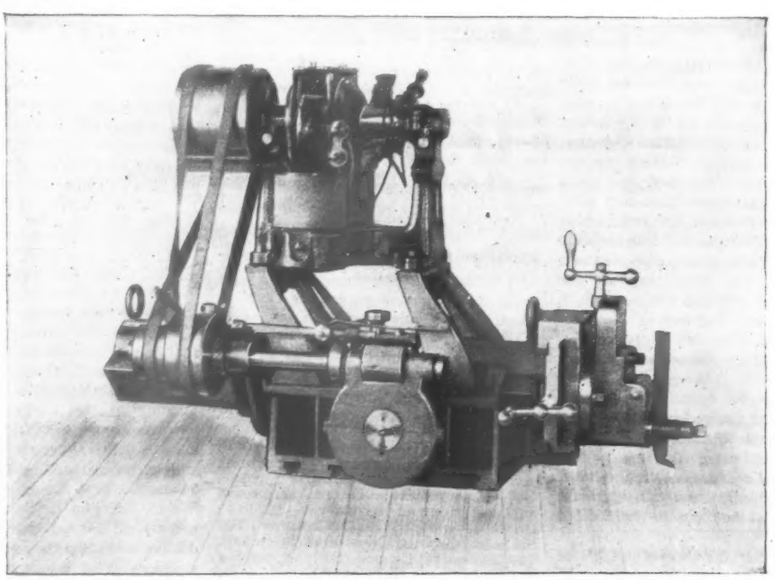

FIG. 2.—PORTABLE SHAPER DRIVEN BY CROCKER-WHEELER ELECTRIC MOTOR.

Book Review.

"The Infringement of Patents"—Thos. B. Hall—published by Robert Clark & Company, Cincinnati.

This work is a collocation of syllabi of decisions of the United States Supreme Court in patent cases. The title is rather a misnomer, since but 23 pages out of 246 are devoted to a consideration of the title head. Of course, all patent controversies arise from infringement, so that the various sub heads—license, identity of invention, validity, recovery, etc., afford opportunity to take in the whole field of patent litigation. The book will be found serviceable to those specially interested in patent matters, as giving in a condensed form the gist of the numerous patent decisions made by the Supreme Court. Although a comparatively small book, a large amount of information is between its covers, briefly and clearly expressed, and it will be a handy thing for those who want to learn quickly the various opinions of the Court upon any general branch of the subject.

The Woonsocket, R. I., electric street cars will soon be equipped with fenders of improved design, which have been satisfactorily tested in actual service.

A Severe Test Given to the Universal Electric Company's Conduit System at Coney Island.

There is nothing that is perfect, for perfection is something unobtainable; but that which comes nearest to fully meeting the demands made upon it may have applied to it the word perfect, in a comparative sense. There are no railroad systems, either steam or electric, that cost nothing to maintain, so we must therefore be satisfied with the one which requires the least amount of money for its running expenses. Nothing is absolutely safe, but the electric railway system which comes nearest to perfection in this respect is undoubtedly the conduit or subterranean system. Of these there are a great many, but they all, more or less, require conditions which are not afforded by our American, or for that matter, the climate of any of the civilized countries.

Since June of this year there has been in operation at Coney Island a conduit electric system which differs in many respects from others which have been tried heretofore. It was described in a recent issue of the ELECTRICAL REVIEW, and, since its installation, has worked without a hitch. On Friday afternoon, September 15, a test of the most severe kind was made, which stamps this conduit, controlled by the Universal Electric Company, whose offices are at 36 New street, as a practical and efficient system. The test road installed at Coney Island was the scene of operations, and the conduit for a distance of about 75 feet was filled with mud of about the consistency of soft paste. It was so filled that the contact pieces were submerged, and the shoe underneath the car which receives the current from these contact points ran entirely under water. The car was stopped, started both backwards and forwards without any noticeable difference due to leakage, and, in fact, recent tests made by a disinterested representative of one of the large electric companies show that only an inappreciable amount of current is lost when the contact boxes are completely covered with mud. This condition could never arise in actual practice, but this exaggerated strain on its efficiency shows beyond a doubt what the system is capable of successfully standing.

Old-Time Telegraphers.

The thirteenth annual session of the Old-Time Telegraphers' Association and the United States Military Telegraph Corps was held at Chicago last week. President W. R. Plumb opened the session with a short address of welcome. The following officers were elected for the ensuing year: President, W. R. Plumb, Chicago; vice-president, W. H. Wilson, Philadelphia; secretary and treasurer, J. E. Pettit, Chicago. The members visited the World's Fair, and concluded the session with a banquet at the Great Northwest Hotel.

The Western Electrical Supply Company.

The Western Electrical Supply Company, of Omaha, Neb., which was recently incorporated under the laws of the State of Nebraska, with a capital stock of $30,000, is a new concern which purchased of W. H. McKinlock the entire assets of the Western Electrical Supply Company, an Illinois incorporation, and formerly doing business in Omaha. The officers are as follows: President, W. H. McKinlock; secretary, John T. Burke; treasurer, George W. Johnson. W. H. McKinlock was instrumental in the formation of the Central Electric Company, of Chicago, and has been for years long and favorably known in the electrical fraternity. John T. Burke, the secretary, was very closely identified with the telephone interest in the early days. He was for eleven years with the Nebraska Telephone Company, and during that time had a very wide and diversified experience in this branch of electrical work. Since that time for five years he was superintendent of construction for the old Midland Electric Company, of Omaha, and in that capacity installed many of the central stations and isolated plants erected in that section of the country. For the past three years Mr. Burke has been an electrical engineer and contractor, with offices in Omaha, and has completed some very large contracts for the complete installation of electrical plants, and also for electric wiring. Mr. Burke is a deep student, and admitted to have a wide and practical experience in all branches of electrical science. He has charge of the construction department of the company, and is eminently fitted for such a position. G. W. Johnston, treasurer of the company, has a wide experience in the electrical supply business. He was one of the founders of the Gate City Electric Company, of Kansas City, Mo., and held the position of secretary and treasurer of that company for several years, after which he accepted the position of general traveling representative of the Central Electric Company, of Chicago. With the experience derived from personal contact with the trade in all parts of the United States, he has become thoroughly conversant with the needs and requirements of the electrical trade. The Western Electrical Supply Company, of Omaha, is the Western agent for many well known electrical specialties, including the International Okonite Company, Interior Conduits & Insulation Company, Eddy Electric Manufacturing Company, American Electrical Manufacturing Company, Burke automatic lightning arresters, Hart switches and Meston alternating fan motors. The company is receiving orders from the South and East, and is constantly receiving orders from the far West, and it recently shipped an entire installation, including engine, dynamo, necessary wire, lamps, sockets, etc., to Chihuahua, Mexico. The company is very strong financially, and with the stockholders as active managers it is bound to succeed. It is always upon the lookout for new specialties, and is always glad to contract for anything of merit.

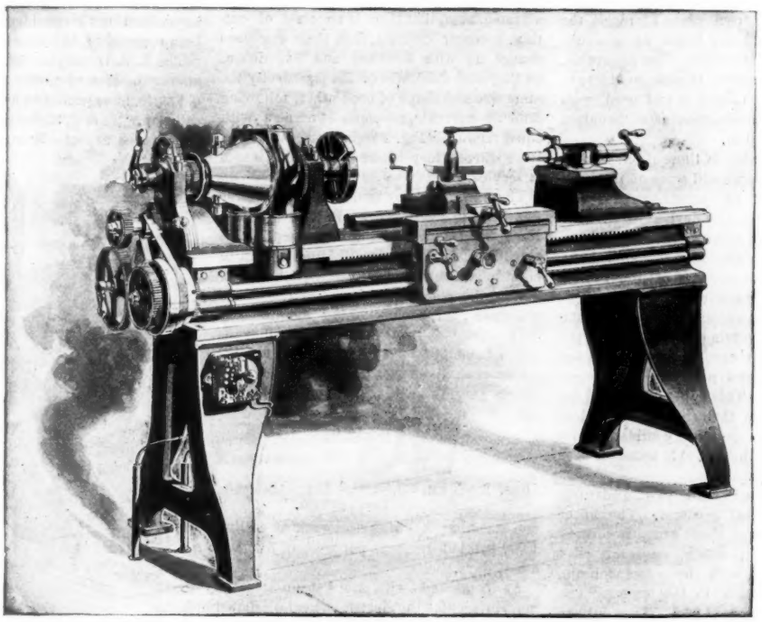

FIG. 3.—POWER LATHE DRIVEN BY CROCKER-WHEELER ELECTRIC MOTOR IN HEAD STOCK.

Electricity on a Pyramid.

In his autobiography, the late Sir W. Siemens relates an amusing anecdote. An Arab called his attention to the fact that when at the top of the Pyramid of Cheops, when he raised his hands with fingers outspread, an acute singing note was heard, the sound ceasing as soon as he let his hand fall. "I found his assertion" he writes, "to be true. As soon as I raised one of my own fingers above my head, I felt a prickling in the fingers. That this could only be caused by an electrical phenomenon was proved by the slight electric shock felt on trying to drink out of a wine bottle. So I wrapped a full bottle of wine that I had with me in damp paper, and thus converted it into a Leyden bottle, which was soon strongly charged with electricity by the simple device of holding it high above my head. The Arabs had already become distrustful on seeing small lightnings, as it were, issue from the wine bottles held up by myself and companions, and now held a brief consultation. Suddenly, at a given signal, each of my companions was seized by the guide who had led him up, who now tried to force him to go down again. I myself was standing at the very top of the pyramid, when the sheikh of the Arabs came to me and told me, through my interpreter, that the Arabs had determined that we were at once to leave the pyramid, because we were practicing magic, and it might damage their chance of their earning a living. On my refusing to obey orders, the sheikh caught hold of my left hand. I had awaited this moment, and held up my right hand with the bottle in the attitude of a magician, afterwards lowering it slowly towards the point of the sheikh's nose. When quite close to that feature I felt a violent shock run through the bottle to my own arm, and was certain that the sheikh must have received the equivalent. At any rate, he fell speechless on the stones, and a few anxious moments passed before he rose suddenly with a loud cry, and sprang down the gigantic steps of the pyramid with long strides. The Arabs seeing this, and excited by the sheikh's constant cries of 'Magic! magic!' released my companions and followed their leader, leaving us complete masters of the pyramid."

An Electric Horse-Feeder.

The London *Field* describes a new invention, brought out by Mr. Alderson, of Chesterfield, England, for securing the regular feeding of horses during the absence from any cause of the stableman or groom. The apparatus is described as being very simple, the law of gravitation being depended upon to accomplish most of the work. The first requisite is an alarm clock, which should be good enough not to stop casually, but need not be expensive. The electrical plant is that needed for an ordinary electric bell, four cells of the Leclanché type of battery being sufficient for any distance up to 200 yards. The third portion of the apparatus is the feeder—that is to say, the vessel holding the corn, or corn and chaff, as the case may be. The clock, which is the prime mover of the whole concern, may be in the house, the harness room, or anywhere; but if it be more than 200 yards away from the feeder a more powerful battery will be required.

To use the feeder, the first thing is to set the alarm of the clock at the hour at which it is desired that the horse should be fed. The food is then placed in a tin like biscuit box, which is turned upside down and placed in the proper compartment of the shoot, when the lid of the box is drawn out; the corn then resting upon the floor of a trap-like arrangement, held in its place by a simple contrivance. When the alarm goes off a button is pressed, and the circuit is completed. A weight falls, the bottom of the feed box is released, and the corn falls out into the manger. By employing a simple arrangement the same clock and electrical apparatus suffice to feed horses in other boxes or stalls.

A New Commutator Brush.

The firm of J. C. Koch, of Hohenlimburg, Germany, have patented another commutator brush, which is constructed out of chemically pure wire, in which are imbedded metal tubes especially made of aluminium, and the whole covered with a mantle of fine wire, but woven after the manner of lace.

The tubes are kept against the commutator with an adjustable force, permitting the tubes to be always kept against the commutator, notwithstanding wear.

The improved brush is more resistant to wear than those of usual construction having the same contact surface. It is therefore possible to press the brush more forcibly against the commutator, and, consequently, increase the conductivity, as it is well known that the chief electric resistance is found in the place of contact. In order to clean the brush one has only to blow through the tubes, which removes the dust, and this is certainly a great advantage.

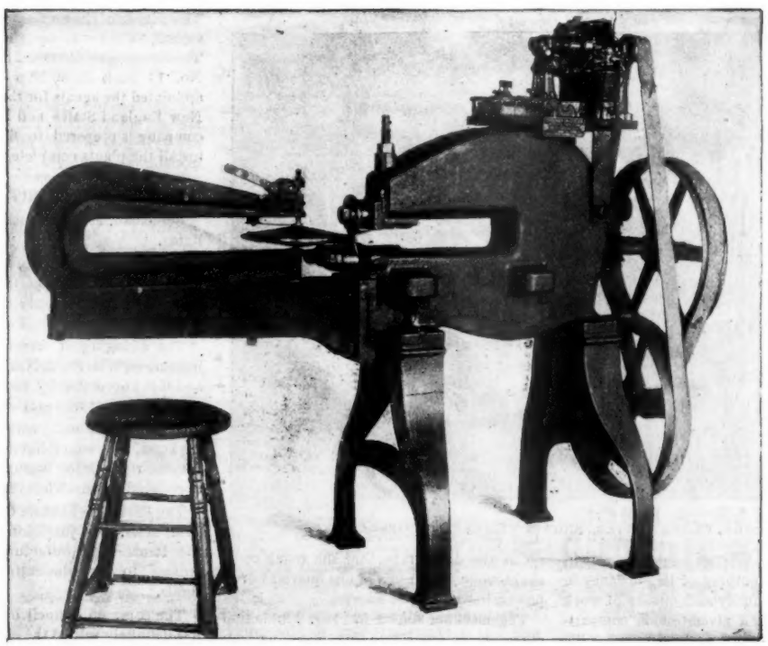

FIG. 4.—SHEET METAL POWER SHEARS RUN BY CROCKER-WHEELER ELECTRIC MOTOR.

A New Electric Cloth Cutter.

To meet the requirements of the numerous large establishments engaged in the manufacture of ready-made garments, in which many hundreds of yards of fabrics of various kinds are cut to pattern every day, to be fashioned into articles of wearing apparel, machines have been devised to do rapidly and with accuracy the most laborious part of the work, namely, that of cutting the material, and have found their way into service to a considerable extent. The machines thus far introduced, though exhibiting considerable ingenuity, and answering their intended purpose as labor-saving appliances quite well, are, nevertheless, not entirely satisfactory. They are steam-actuated, and generally very large, more or less cumbersome devices, operated upon a special table, to which they are attached.

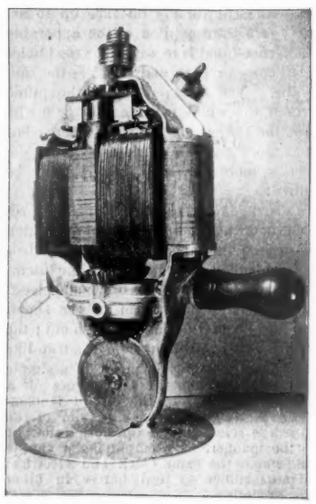

FIG. 1.—ELECTRIC CLOTH CUTTER.

There are manifest drawbacks to the general serviceability of apparatus for this purpose, and with the view of doing away with them the machine herewith illustrated, and about to be described, was devised, in the design and construction of which the object was to produce an apparatus which, while sacrificing nothing of its efficiency in respect of the quantity and quality of work that it could do in a given time in comparison with its predecessors, should possess the highly desirable features of compactness and complete portability, the absence of which features had greatly hindered the introduction and limited the usefulness of the cloth-cutting machines previously known and used.

The outcome of the effort to solve the difficult elements of this mechanical problem was the electric cloth-cutting machine, which is shown herewith, and which will be understood from the following description:

In general terms, the device consists of an electric motor of light, compact construction, which, taking current from an incandescent light circuit, sets in rapid motion a circular revolving steel cutter. The operator, in using the machine, takes hold of it by the handle, and, guiding it by the line to be cut, passes it, as fast as the cutting takes place, through the material. The apparatus is perfectly portable, the flexible conductor conveying the current affording no hindrance to its movement from place to place, the slack of the cord being taken up by a suitably-disposed counter-poise. The apparatus, it will also be observed, is quite complete in itself, and may be moved to and used upon any table, unlike the steam-actuated machines previously referred to.

For the information of those of our readers who may desire it, we add some of the more important details of construction. The machine was originally devised so that the cutting mechanism was formed of an arrangement of scissor blades. It was found, however, that this disposition of the cutters introduced some inconvenience in sharpening, and it was abandoned in favor of the single circular revolving cutter seen in the illustrations. An excellent representation of the improved and perfected machine is shown in Fig. 1. This apparatus (called by the manufacturers their Style 3 machine) weighs about 35 pounds, complete. Its dimensions are: height, 17 inches; base diameter, 8 inches.

It is constructed with two armatures placed in a vertical position. The lower ends of the shafts of these armatures carry bevel gear wheels, which, engaging with gearing connected with the cutter spindle, communicate motion to the cutter. The knife revolves at a speed of 2,500 revolutions a minute, and is kept sharpened by an adjustable attachment carrying a small emery wheel, which can be applied to the rapidly-revolving knife at the proper angle, so as to insure the maintenance of a sharp cutting edge.

There are three pole pieces to the field system, the center one being common to both armatures. This method of construction, it will be seen, effects considerable economy in space and material, and makes the machine more compact. The armatures are of the drum type, and the machine is shunt-wound and rated at one-quarter horsepower.

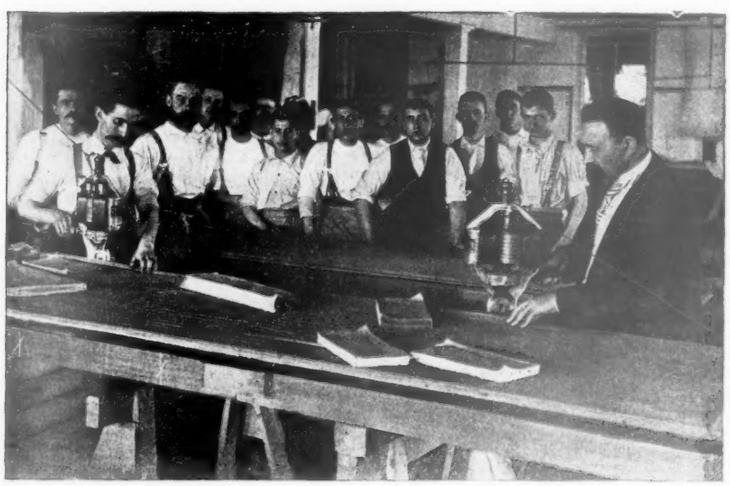

FIG. 2.—ELECTRIC CLOTH CUTTER, SHOWING MANNER OF OPERATING.

The machine shown in Fig. 2 in actual operation is similar to that just described, save that it has a single armature, and, in consequence, is lighter—it weighs only 15 pounds and is rated at one-eighth horsepower. A feature of convenience that should not be overlooked, is the use of an incandescent electric lamp to illuminate the work. This lamp is fed by its own wires, and carried along with the machine, giving light just where it is needed. It is a great help in operating it, since it permits of carrying on the delicate work of cutting with the greatest ease in dark apartments and on dark days.

With these instruments fabrics of any description, of thick or thin texture, may be cut with remarkable precision and with great rapidity. They will cut the finest linen as readily as the coarsest cloths, taking at a single cut a thickness of three and a half inches. Their compactness and portability enable them to be used with ease by the novice after a few hours' instruction. It is affirmed, also, that there is no class of cutting, however difficult, that these machines cannot do with accuracy and expedition, cutting each thickness of the lay exactly the same size and shape of each other, following difficult curves and square corners with equal facility. Fig. 2 represents a view in a large shirt factory where the machine is seen in service.

These machines are said to be used in large numbers in New York, Boston, Buffalo, Rochester, Chicago, and elsewhere. One machine, it is affirmed, will do the work of eight men. As an example of its serviceability, the statement is vouched for that in a certain New York clothing manufactory one machine is doing the work of cutting 1,000 pairs of trousers per week of five and a half days.

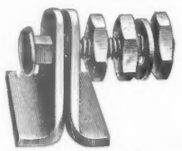

FIG. 2.—THE "S. & C." INTERLOCKING CARBON CONNECTOR.

As compared with the steam-actuated machines which the electric cutter is designed to replace, it is asserted that the latter not only possesses the substantial advantages of portability and small size, but also that it is capable of performing a considerably greater amount of work at one-fifth the cost of operating. The cost of running a steam cutter is said to be $1.50 per day, while that of the electric cutter is said to be but 30 cents. In fact, it is a machine which no progressive manufacturer who employs textile fabrics in his business can afford to do without.

This invention unquestionably signalizes a substantial advance in its particular field. The Electric Cutter Company, of 166 Elm street, New York, are the manufacturers. The Consumers' Electrical Supply Company, No. 13 Park Row, New York, have been appointed the agents for this machine in the New England States and New York. This company is prepared to fill all orders and install the plants complete.

ELECTRIC LIGHT FLASHES.

Buchanan, Mich., is soon to have electric lights.

The town of Braintree, Mass., has got the contract for supplying the Braintree and South Braintree railroad stations with electric lights.

The stringing of wires for incandescent lighting in Waterford, N.Y., is being pushed, and it is hoped that by the first of this week they can be put into service.

Stillwater, Minn., will no longer be in darkness, the council having made a contract for electric lighting with the old company, at reduced rates. The citizens rejoice.

The Berkshire Electric Company, of Pittsfield, Mass., has just closed a contract with the Renfrew Manufacturing Company, of Adams, to wire the entire mill for electric lights.

The common council of St. Paul, Minn., has definitely settled the contract for having electric lights here by approving the $5,000 bond of the Western Electric Company, which has the contract for the work.

The Electric Light Company, of Springfield, Mass., has decided to sell their light to private consumers in the future only by meter. The consumers are threatening to take out their lights, but the company asserts that getting paid in full for two thirds of the present number of lights is better than getting paid for only one-half, as now.

The "S. & C." Interlocking Carbon Connector.

Since the introduction of carbon batteries for telephone service by the telephone companies, much trouble and annoyance has been caused by the use of a carbon connector which did not insure a tight and rigid connection with the carbon. There was no means of securely locking the wire in place, and loose connections would occur often through the handling of the battery and not be noticed until considerable expense had been resorted to, to locate the difficulty.

The E. S. Greeley & Company, who were among the first to notice the fault with the old style, have produced a carbon conductor called the "S. & C." interlocking, which they claim gives a perfectly rigid grip upon the carbon and connecting wire, and will not turn or work loose after once having been locked in position. It is said that the "S. & C." overcomes the faults found with the old style connector, and is destined to replace all those of the old style now in use on the carbons of the telephone standard batteries.

FIG. 1.—THE "S. & C." INTERLOCKING CARBON CONNECTOR IN USE.

We present two views of the "S. & C." connector herewith, one showing it in detail and the other as it appears on the telephone standard carbon.

The principal features of the "S. & C." are its interlocking qualities, its large contact surface, and the means of supporting the carbon on the battery cover.

It will be noticed in the detailed cut that the bolt has a square neck, and that it fits into square holes in the contact plates, thus interlocking, and prevents the bolt from turning when the nuts are screwed up.

The telephone line between Ellsworth and Sedgwick, Me., is completed.

ADVANCE INFORMATION.

New Electric Companies Formed and Important Constructions Projected.

VALUABLE INFORMATION FOR MANUFACTURERS AND DEALERS.

We publish below the earliest information obtainable relating to new electric railways, new electric light companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW from week to week.

Electric Light and Power.

LYKENS, PA.—The Citizens' Light, Heat and Power Company has been incorporated, with a capital of $10,000. The directors are F. J. Douden, J. J. Nutt, J. B. Whitney and others.

LYNDONVILLE, VT.—P. N. Vail has purchased property, and will establish an electric light plant at Lyndonville.

NATCHEZ, MISS.—The Natchez Light, Power and Transit Company has been granted a charter by the Secretary of the State. The principal stockholders, Abram Moses and Maurice Moses, are officers of the Natchez Street Railway Company and the Natchez Electric Light, Heat and Power Company.

ROME, N. Y.—The special committee on electric lighting has submitted its report, recommending that the city construct its own electric light plant. Accompanying the report is a voluminous report from the electrical expert, C. O. Mailloux, of New York city. It is estimated that the city can build its own plant for $42,000, and that the cost per lamp can be lessened to about $90, and, perhaps, considerably more. The present price is about $120. The committee has reported in favor of the city owning its own plant.

FINDLAY, O.—The Hancock Light and Power Company, of Findlay, has filed articles increasing its capital from $25,000 to $80,000.

New Electric Railways.

ASHEVILLE, N. C.—The Asheville street railway property, including rolling stock, franchises and real estate, has been sold by a master commission in chancery to A. D. White, of New York, and his associates, representing some of the bondholders. The purchase price was $175,000. Objection by other bondholders was made to the sale, which is subject to various outstanding mortgages.

HAWLEY, PA.—I. H. Burns, of Scranton, Pa., is interested in a project to build an electric street railway in Hawley. If the road is successful, financially, it will be extended to Honesdale.

SCRANTON, PA.—The Scranton and Pittston Traction Company; capital, $1,000,000. Incorporators, Thomas Grimwood, of New York; Charles H. Mullen, of Mount Holly Springs; William F. Sadler, of Carlisle; John T. Lanahan, of Wilkesbarre, and Lamuel Amerman and Louis A. Watres, of Scranton.

ROYERSFORD, PA.—The Royersford borough council has granted a franchise to the Royersford and Spring City Electric Railway Company, to lay tracks on the principal streets of the borough.

NANTICOKE, PA.—Work has commenced on the construction of an overhead trolley railway to connect Nanticoke, Glen Lyon, Alden and Wanamie.

JERSEY CITY, N. J.—The New Jersey Consolidated Traction Company has notified the Jersey City Street and Water Board that it accepts the terms of the ordinance recently passed, authorizing the company to operate electric motors in certain streets.

WAVERLY, N. Y.—Simon Fitzgerald, of the Christy Construction Company, of Akron, O., will superintend the construction of an electric street railway in Waverly.

CARLISLE, PA.—The Cumberland Valley Electric Passenger Railway Company; capital, $300,000. Incorporators, W. J. Ickes, S. Ritter Ickes and Oliver H. Ormsly, all of Altoona, Pa. The new line will traverse streets of Carlisle and run to Boiling Springs.

NEW HAVEN, CONN.—Within a few days it is expected that the announcement will be made that the New Haven & Centerville Horse Railroad Company has sold its property to a New York syndicate. It is reported that the new owners will equip the line with electricity.

DENVER, COLO.—The Tramway & Metropolitan railway companies have been consolidated. The name of the new company will be the Denver Consolidated Tramway Company, and the capital stock of $1,000,000 and $100,000 will be increased to $3,000,000. The new officers of the consolidated company are Rodney Curtis, president; William G. Evans, secretary; John J. Riethmann, vice-president; F. A. Keener, treasurer.

WILMINGTON, DEL.—The Wilmington and Chester Electric Railway Company has perfected a temporary organization by electing James McComb, of Claymont, president, and T. Cooper, of Dover, secretary and treasurer. Work on the construction of this road will begin at an early date.

PHILADELPHIA, PA.—The Hestonville Passenger Railway Company, which controls 20 miles of track, will make arrangements to trolley the system this month. About $500,000 will be needed to finish this work, and this sum will probably be raised by the organization of an independent company.

MILLVILLE, N. J.—Philadelphia capitalists will ask the Vineland council for permission to build an electric railway from Vineland to Millville. A franchise to establish an electric light plant in Vineland will also be asked.

BROOKSVILLE, FLA.—Asa D. Roberts, of the Brooksville *Star*, is interested in a project to build an electric railway to connect Bay Port and Brooksville.

New Manufacturing Companies.

NEW YORK, N. Y.—The Universal Electric Pull Socket and Switch Company, to manufacture and sell electric appliances in New York city; capital, $20,000. Directors: John M. Wellbrook, of Brooklyn; Louis Stirn and Maurice Sonborn, of New York city.

CLEVELAND, O.—The Elliott Electric Company, of Cleveland, has filed articles increasing its capital stock from $40,000 to $75,000, and changing its name to the Elliott-Lincoln Electric Company.

A Large and Progressive Binding and Mailing Concern.

The Gardiner Binding and Mailing Company, of this city, have purchased the business of the Addressing, Duplicating and Mailing Company, and have consolidated the entire business of the two companies under one roof, making the largest newspaper and pamphlet bindery in the United States, occupying two floors of the Metropolitan Realty Building, 214 and 218 William street.

This business is one that is for the accommodation of the trade, and is open night and day, so that contracts made will have the advantage of night work in case of mishap. Their addressing department is the most complete in the country, having the largest library of directories and gazetteers of the latest issues, from which they are prepared to furnish lists, address envelopes or wrappers to all trades or professions in this or other countries. All their work is done with the latest and most improved labor-saving machinery and devices.

This company has bound the ELECTRICAL REVIEW for several years, and their work has been uniformly satisfactory.

Underwriters' International Electric Association.

A meeting of the sub-committee appointed at the meeting of the electrical committee of this association, recently held in Chicago, was held at the exchange rooms of the New England Insurance Exchange, Boston, Mass., on September 5, 6 and 7, to consider certain matters referred to them by the Chicago meeting, and also to define the word "approved," as used in the present underwriters' rules.

The committee consisted of F. E. Cabot, superintendent of the survey and electrical department of the Boston Board of Fire Underwriters; Geo. P. Low, electrician of the Pacific Insurance Union; E. A. Fitzgerald, electrical inspector of the Underwriters' Association, of New York State; Wm. H. Merrill, Jr., electrician of the Chicago Fire Underwriters' Association; A. E. VanGeisen, electrical inspector of the New York Board of Fire Underwriters.

All of the above gentlemen were present, as were also Mr. George W. Wilson, electrical inspector of the Boston Board of Fire Underwriters; J. Couilliard, electrical inspector, and C. H. Goddard, secretary and electrician of the New England Insurance Exchange.

The principal work of the committee was considering what forms of insulation for wires and materials for fittings would be approved by the Association; the drawing up of rules for the introduction of automatic fire alarm systems, and considering a few amendments to the rules which were referred to them by the meeting at Chicago.

All their recommendations on these points will be submitted to the remaining members of the electrical committee for approval, after which the work of the committee will be put in shape and forwarded to the underwriters' organizations in the United States.

By invitation, the committee visited the laboratory of the American Bell Telephone Company, and examined devices for protection of telephone and other wires against abnormal current.

By courtesy of Mr. A. E. Bliss, general manager of the Malden Electric Light Company, the committee visited the station at Malden, Mass., and were allowed the use of their 500 volt dynamo for testing various forms of cut-outs for high potential circuits.

The experience of the various members of the committee, together with the fact that the amendments to the rules now in force were very few, are convincing proofs that the work of the committee and association thus far has been extremely successful, and that the rules recommended by them have been found satisfactory, both to the insurance and electrical interests.

TELEPHONE CHAT.

The new metallic circuit telephone line between Jamestown and Bradford, Pa., is completed, and is in operation. It is a direct line between the two cities, and will be a great improvement over the old local lines by way of Warren.

Chancery proceedings have been commenced by the American Bell Telephone Company in the United States Court against several Chicago manufacturers and operators of electrical telephones. The complainant company bases its action upon the Alexander Graham Bell telephone patent of January 30, 1877. The defendants in the several suits are Willis L. Adams, Western Telephone Company, Electric Appliance Company, D'Unger Electric Telephone Manufacturing Company and the Brown Telephone and Telegraph Company. The Bell Company complains that defendants have furnished telephones at less than established prices, and that they have refused to pay royalties. A decree is asked to recover the profits obtained by the sale of such instruments, and also damages.

Telephone Injunctions.

In the United States Circuit Court for the northern district of Illinois, on September 6, Judge Jenkins granted injunctions in favor of the American Bell Telephone Company against Sylvanus D. Cushman and others and William Hubbard and others. The patent which the defendants were declared to be infringing was the Bell patent of January 30, 1877.

A Patent Telephone Call Card has been sent the REVIEW with the compliments of P. F. McBreen, the William street printer. The invention is a very convenient and ingenious folding card, on which to arrange alphabetically the names and numbers of the telephone subscribers with whom you transact business regularly.

J. W. Penfield & Son, Willoughby, O., are sending out some very handsomely illustrated and printed matter describing their Imperial friction clutch, power transmission machinery, etc. This clutch is said to possess many advantages which make it especially valuable for use in electric light and power plants.

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ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENTS OF THE UNITED STATES WERE ISSUED ON AUGUST 29, 1893.

508,981 Signaling apparatus for railways; John Orme, London, England.

504,011 Automatic telephone; Josef Wratetsch and Stephan Gergaesevies, Gray, Austria-Hungary.

504,042 Electric circuit for controlling trains; Frank E. Kinsman, Plainfield, N. J.

504,082 Hanger for electric lights; John P. Heben-Dahl, Weatherby, Pa.

504,087 Electric bowling alley; Pehr P. Nelson, New York, N. Y.

504,095 Electric clock; Emil Schweizer, Sumiswald, Switzerland.

504,103 System of telephonic intercommunication; Frank R. Colvin, New York, N. Y.

504,104 Electric conduit for railways; Joseph I. Conklin, Brooklyn, N. Y.

504,113 Electric railway trolley; Alex. Palmros, Lynn, Mass., assignor of one-half to Varna J. Pierce, Hudson, Me.

504,123 Circuit switch; Charles E. Dey, Denver, Colo.

504,130 Electric battery; Hosea W. Libbey, Boston, Mass.

504,132 Means for transmitting power from car axles to dynamos; Morris Moskowitz and Samuel Young, Newark, N. J., assignor of one-half to Leon D. Adler and Joseph Loewenberg, same place.

504,148 Push button; Wm. H. Berrigan, Jr., New York, N. Y.

504,160 Rheostat; Albert B. Herrick, Schenectady, N. Y., assignor to the General Electric Co., Boston, Mass.

504,161 Brush for dynamos or electric motors; Frederick H. Sandherr, St. Louis, Mo.

504,196 Electric indicator; Jay L. Bradley, St. Louis Mo.

504,216 Regulator for dynamo-electric machines; John C. Henry, New York, N. Y.

504,249 Multiple switchboard keyboard apparatus. 504,250 Telephone exchange testing apparatus. 504,251 Vibrating circuit breaker and retardation coil for test systems; Chas. E. Scribner, Chicago, Ill., assignor to the Western Electric Co., same place.

504,255 Electric railway trolley; Frank J. Sprague and Patrick F. O'Shaughnessy, New York, N. Y., assignors to the Sprague Electric Railway and Motor Co., same place.

504,271 Electric arc lamp; Rudolph M. Hunter, Philadelphia, Pa., assignor to the Thomson-Houston Electric Co. of Connecticut.

504,276 Crossing for electric railways; Jay Nelson, St. Louis, Mo., assignor of one-half to Thomas C. White, same place.

504,277 Electric arc lamp; Wm. A. Phillips, U. S. Army, assignor of one-half to Thomas S. Porter, Miles City, Mont.

504,286 Dynamometer; Henry C. Stone, Kansas City, Mo., assignor to Olive A. Stone, South Evanston, Ill.

The Electrical Engineering Company, 249 Second avenue, South, Minneapolis, Minn., are sending out printed matter describing the Garton lightning arrester, the Packard lamp and other electrical specialties which they handle.

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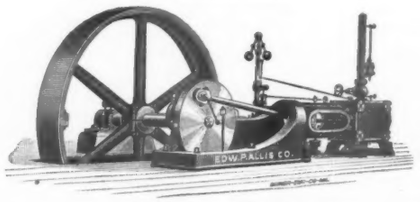

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